Engineering News-Record

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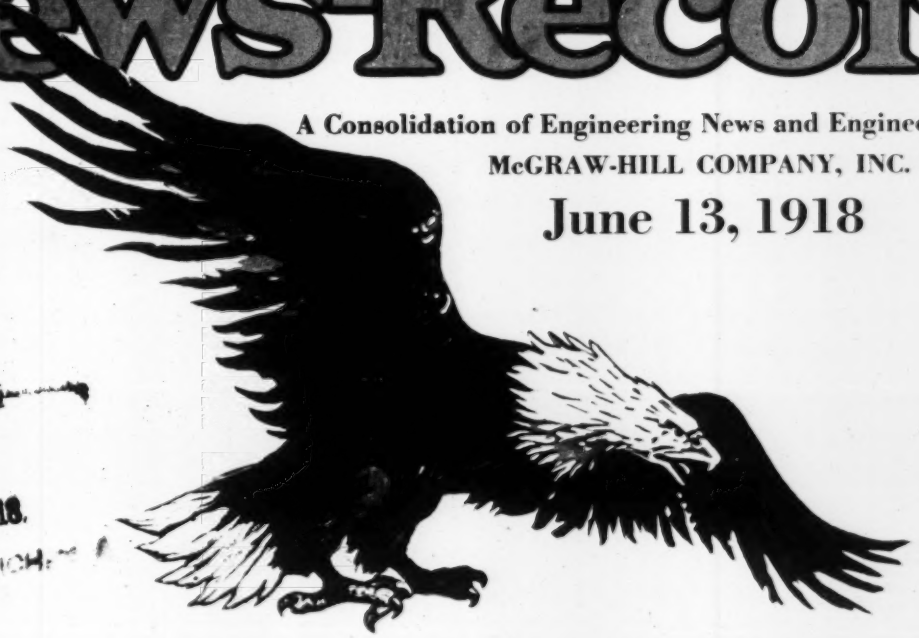
McGRAW-HILL COMPANY, INC.

June 13, 1918



Engineering

JUN 17 1918.

UNIV. OF MICH.

Flag Day and Americanization

FLAG DAY, June 14, calls this year with a new note for the dedication of each American to his country's service. Moreover the Government asks that it be made the occasion of a concerted move by industry to bring to the support of our war efforts the full energies of our 35,000,000 population of foreign birth or parentage.

THEY must be made to realize that this fight is their fight; that their futures and those of their children are bound up with the fortunes of the new land with which they have cast their lot.

THEY will make it their fight only if they have been or can be Americanized; if the allegiance to the old country can be rooted out and replaced by love for the new—a love based on confidence of securing a "square deal," equal opportunity. If they have been exploited it will be difficult to Americanize them; if they are still being exploited it will be impossible until the exploitation is succeeded by a demonstration of fair treatment.

FLAG DAY is an appropriate time for all employers and influential citizens to become interested in this work of Americanization. The word, coined about three years ago, signifies the implanting in the foreign-born of a clear idea of American standards, a realization of what an American should be, of the privileges and rights that are his. We need the support of the foreign-born now as never before. We need them that there may be no defection in our ranks; that they may put their energies with whole hearts into the work of safeguarding the liberties which they came to this country to enjoy.

IN THIS WORK all can help, some by direct effort, others by their influence. The problem is important for our social future.

AN ARTICLE on making labor thoroughly American will be found in this issue.

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ENGINEERING NEWS-RECORD

A WEEKLY JOURNAL
DEVOTED TO CIVIL ENGINEERING
AND CONTRACTING

E. J. Mehren, *Editor* — Charles Whiting Baker, *Consulting Editor*

Volume 80 — NEW YORK, THURSDAY, JUNE 13, 1918 — Number 24

Quantity Production Of Concrete Ships Starts

WITH the letting of the five agency contracts for concrete ocean-going ships the Government has fairly committed itself to this new type of marine construction. For the past six months a large and competent technical organization has been thoroughly studying the many new problems presented by so radical a divergence from established practice. Meanwhile, the first real ocean-going concrete vessel has proved itself seaworthy on an initial trip of more than usual severity. Satisfied that theoretically the big concrete ship is possible, and encouraged by the fine behavior of the "Faith," the Shipping Board embarks on quantity production of concrete vessels of unprecedented size with full confidence in their early completion and successful service. No qualified person anticipates the substitution of concrete for steel in future ship construction, but even those who a few months ago were skeptical now appreciate that unless all present evidence is false there has been developed a new source of shipping which will do much toward supplying the tonnage so necessary to the war.

Executive Leadership Should Be Strengthened

EXECUTIVE governmental leadership as the need of the hour was rightly emphasized at the War Economy Conference reported on another page of this issue. Where such leadership is lacking it is not an inherent weakness in democracy, but rather an ingrown weakness of our governmental institutions, due to withholding full powers of initiative and control from our executives. A perversion of the basic principles of representative government has resulted in the usurpation of administrative functions by our legislative bodies, Federal, state and municipal. The remedy is a clear-cut separation of legislative and executive powers and a strengthening of the latter.

Legislation Should Be Framed and Pushed

WHETHER it be President, Governor, Mayor or city manager, our Government heads must have full initiative and continuous control to insure the efficiency and economy in all branches of the Government which are essential to win the war and reap the full fruits of peace after the war. Public opinion cannot focus on this fact too soon. Legislation to this end is essential in many quarters and should be wisely framed for passage at the earliest possible moment. Congress has already done much to this end—for the period of the war. Most of our state legislatures will be in session in 1919. It is time to begin to frame bills to improve state administration in all those commonwealths which have not yet made their Governors real executive heads, and which still have a multiplicity of uncoördinated, multi-headed boards and commissions. Single-headed administrative commissions are essential to real progress, as Governor Lowden of Illinois pointed out in the War Economy Conference mentioned in the foregoing paragraph. An extension of the commission-manager plan in the municipal field would make for war economy and general efficiency.

Budget Procedure Reforms Are Needed

AFTER giving executive leadership full scope nothing would contribute more to governmental efficiency, both in war and peace times, than sweeping reforms in budget procedure. So important was this matter considered by the program makers that it was given a full session at last week's War Economy Conference. Budget reform in the United States should begin at the top—that is, at Washington. Ours is the only civilized nation that makes no budget at all, in the true sense of the word. Most of our states and cities are just as backward. A ship might as well try to sail without a chart as a state or city without a budget. American failures in budget making are linked with the withholding of administrative powers from the chief executives of our governments. Engineers and contractors suffer from both defects. They should join, individually and collectively, in helping remove these defects at a time when their effects are more serious than ever before.

Sound Development of Highway Transportation

CONSIDERATION of the recent employment of motor trucks has left little doubt of their value as a means of interurban transportation. Many people believe that they offer the solution for all freight congestion problems, and advocate their development to the utmost in the present emergency, irrespective of the condition of the highways which they must traverse. Others take a more conservative stand and deprecate

any development of motor transportation beyond that which the highways can safely carry. While this journal does not wish to see the expansion of the motor truck industry restricted, it leans toward the conservative view. With this as with most other cases of rapid progress, there is always danger of going too far. Suppose, as one speaker asserted at the meeting of the Highway Transport Committee, reported in this issue, that a motor truck can go anywhere a mule can. What advantage is gained if this traffic puts highways in a condition impassable even for a mule? In that case the transportation shortage would not be helped, but would actually be increased by eliminating the capacity which might be supplied by lighter conveyances. Moreover, opposition to motor traffic, which has already developed in many quarters, would in all probability retard progress unnecessarily. If properly prepared the highway can be a large factor in the solution of our transportation difficulties, and it will be unfortunate if, in the study of the main problem, those in authority entertain a disproportionate idea of its value. It is to be hoped, as was expressed in the resolution of the meeting, that a governmental policy of highway construction and maintenance will be adopted which will permit highway work to proceed upon a sounder basis.

Wanted: Two Thousand Engineers for Active Service

GENERAL BLACK'S new call for engineer officers comes upon a class least able to undertake the possible dangers of foreign service. Between 32 and 42 most men's family responsibilities are greatest; younger men are not so apt to have families or dependents, older ones as a rule will have achieved a competence or their children will be able to shift for themselves. And yet these very facts mark the seriousness of the present crisis. The army must be increased; an increased army must have able and mature engineer officers who at the same time are in condition to stand the rigors of field service. It is but fair that those engineers who volunteered early should be rewarded with the rank of major or better. Only in rare instances is the man of draft age competent technically to take higher engineer rank than second lieutenant. Clearly it is necessary that the men in the thirties and early forties come forward to fill the ranks between.

Each one of us knows his own responsibilities, each one of us by now must understand the task our country has before it. To balance his personal obligations against his obligations to the nation is the task set before every engineer today. It is not now a question of surrendering a congenial civilian berth for a necessary and arduous but not dangerous military assignment within our own boundaries. Men must offer themselves for service overseas for one, two or perhaps three years. To do so is to accept the opportunity of joining that glorious company of American engineers who in a short half-year have written their names indelibly in the history of our times.

The quota will soon be filled. Those who are able to go should volunteer quickly so as to expedite the machinery of the appointments. Fortunately, that machinery promises to be much less cumbrous than it was in the first call for reserve officers. The office of the Chief of Engineers will not be hampered by the necessity of referring appointments to the General Staff, and at the same time it has profited by its earlier mistakes. Effort will be made to deal fairly and rapidly with every application. The qualifications for appointment are simple and definite, the need for men is obvious; let the response be quick and sure.

Politics Halts Another Engineering Project

OPERATION of the dual subway system in New York City may be delayed a year or more if the Mayor and Board of Estimate of that city do not soon take advantage of the legislation passed in April to adjust the construction contracts. The situation, as recorded in this journal a short time ago, is that a large number of the contractors are unable to meet further demands for wage increases on the part of the unionized subway workers. With the increasing cost of living, and with a great deal of construction work for the Federal Government and for war industries going on in the neighborhood of New York, it is impossible for these contractors to hold their men without a wage advance. The union leaders a short while ago announced the men's intention of waiting until June 1 for the advance, and of seeking other work if they did not receive it. They actually waited until June 10, on which day most of the important subway contracts were closed down by a strike.

Meanwhile, the city administration, which had consistently refused to make any suggestions or take any part in framing the legislation looking to relief of the situation, debated as to whether it would sanction any adjustment proposed by the Public Service Commission under the new law. At present, matters are at a complete standstill, the city administration having proposed a solution which several authorities hold to be illegal, which is entirely unsatisfactory to the contractors and which, in the judgment of the Public Service Commission, would not relieve the situation. This solution, stated in plain language, is that, where a contractor cannot obtain additional credit to enable him to meet the wage increase (because no bank cares to lend a construction firm, however strong, money to make good a certain deficit on a losing job) the city shall advance money to the contractor looking for reimbursement to his retained percentage and claims for extras. There was held out to the contractors the bait that this advance might eventually be converted into a gift from the city, though no promise to this effect was offered. The total advances possible under this scheme would not nearly meet the situation, even if they were an outright additional payment to the contractors.

Meanwhile the labor forces are in danger of being scattered. Of course, a large part of the workers live in Manhattan or near the subway sections on which they are employed, and would prefer to work there even at lower wages than are being paid on Government work. If the dispute is drawn out for a month longer, however, most of these men will have moved and it will be impossible to get them back. There is no source

of labor from which they could be replaced, even with unskilled workers. But if sufficient men to complete the work eventually are obtained, organizations already badly disrupted will have to be built over from the ground up, and the city will have to pay for the instruction of the new forces.

During the period of the delay the city will be paying unnecessarily in interest on the capital already spent many times the additional cost of completing the work under the procedure planned by the Public Service Commission.

Also, the public will continue to ride in overcrowded trains for that additional length of time. This last consideration is a political factor which would be given more weight by the city administration had it the acumen to understand the situation. However, appreciation of an engineering analysis of the matter is not to be expected from a group of politicians who fail to recognize a real emergency when they are confronted with it, and who try to make small political capital out of opposing a carefully worked out solution with the cry that they are defending the city treasury against a horde of ravenous contractors.

If New York City is to have an adequate transportation system before the end of the war, the city administration must drop its bickering and come to an immediate positive decision.

What About the Railroad Valuations?

SHOULD the railroad valuations be completed? Should they be suspended for the period of the war? Should they be continued along present lines, or some new plan? Is it proper for railroad men to give their expert views to the technical or lay press on these questions, or must they as Government employees refrain alike from suggesting better ways or approving present methods?

Five years ago Congress, by the valuation act, instructed the Interstate Commerce Commission to appraise the carriers. That the work would be very costly and the results useless when obtained was commonly charged, and from the passage of the act until last December the carriers combatted it at almost every turn. The Commission as well as the carriers has virtually admitted difficulty in interpreting certain clauses of the act, and has declined to make any rulings as to fundamental principles. Yet the inventories have been proceeding, at great expense to the Government and to the carriers, and several have been completed. With our entry into the war it was urged anew that the work be dropped and the men in it be released for more useful occupations. But it has not as yet been dropped.

The taking over of the railroads by the Government last December, and the frequently expressed belief that the Government will end by buying them, gives to valuation a new significance. Whether valuations can be used to fix rates is one question; whether they are needed to determine purchase price is a different one. Some railroad men, considering the latter question, and having come to realize also that the inventories were giving them data of great value for other purposes, have had a reversal of opinion, and would now look with dismay upon the dropping of the work.

And still there remains the question whether the work is being conducted in the most effective manner. Apparently, some of the best results have been obtained where the railroad valuation departments and the Division of Valuation have coöperated closely, or even where the railroads have done the work. The railroad valuation departments are now Government organizations, and it has been suggested to this journal that they are much better fitted to continue the valuations than is the Division of Valuation.

It was this suggestion that prompted *Engineering News-Record* to send out to railroad valuation engineers a questionnaire as to whether the work should be continued and if so, how. The responses are disappointing. While a few have given their views frankly, more hold that because they are Government employees it would be improper for them to speak. The latest to reply is surprised that we should ask his opinion, and believes the advisability of continuing the valuation is entirely in the hands of the Interstate Commerce Commission.

Is it? Seemingly the Commission is obliged to act on its instructions from Congress. It could recommend that the valuation act be amended or repealed, but it has never shown much tendency to recommend legislation. Congress will hardly act without expert advice, and who can give better advice than the railroad valuation men?

Would it be disloyal for these men—Government employees now—to express themselves? Would it not be more disloyal for them to remain silent if they saw a way to save public money, or conduct the work more efficiently? Newspapers have said vast sums are being wasted in the valuation. Many of these railroad men have joined in the charge. Since we entered the war the newspapers have renewed their insistence that the money and labor be turned to more useful purposes. If there is a chance to conserve public funds, are the valuation engineers showing loyalty to the Government by closing their eyes? If the present plan is a good one, can they not allay the suspicions raised by the newspapers—and by themselves in times past?

Engineering News-Record has urged engineers to take a larger part in public affairs. Here is an opportunity. Valuation engineers have been trying for five years to meet the demands of the valuation act. As engineers, they have been dealing with facts. The facts have not changed merely because the engineers have new employers. As engineers they have interpreted those facts—honestly, we believe, and not merely to further the corporate interests they represented. When they were transformed overnight into Government employees, were those interpretations wiped out? If they remain silent let them beware lest it be thought that they have confused public loyalty with a cautious loyalty to the stockholders they no longer represent. They have seen the valuation at close range. Because they deal with facts and scientific reasoning they can command a respect that others cannot. Let them say whether the valuation should be continued, and whether it should be continued as at present conducted.

Americanization a Problem in Human Engineering

Great Mass of Foreign-Born Workmen Must Have Fair Treatment and Equal Opportunity if They Are to Take the Cause of This Country to Heart and Produce the Engineering Materials Needed to Win the War

By Henry D. Hammond
Managing Editor, Engineering News-Record

FLAG DAY—an unwonted subject for an engineering discussion—a day which in the past has made its appeal to patriotism and sentiment, but which this year must inspire the highest order of constructive effort by the engineer. For this war will be won, as all of us know, by increasing the production of war materials to a volume which the enemy cannot match. And, as all of us know, production involves not only the machines, materials and methods with which the engineer has dealt in the past, but human labor, with which the engineer must deal now if engineering training is to justify the accepted view that it enables men to produce the most that can be realized under given conditions.

This human element of labor is a challenge to the engineer. He has applied the laws of physics to produce efficient machines. He has developed methods for recovering and utilizing the natural stores of materials. He must now step in—not as a welfare worker, not as a sociologist, but as an engineer—to help labor find its place in the production scheme.

Urgency of Situation Must Be Realized

This problem is not academic. It is pressing for immediate practical solution along engineering lines. That solution will be found, for if it were not the cause would be lost. The best war organization in history is pressing back the defenders of modern ideals and institutions. Those defenders rely for their means of resistance on a thin line of ships which so far the enemy has managed to sink as fast, or faster, than they could be replaced. Some of the labor that is building those ships has felt that it need work only four days a week so long as it could force a six days' wage. Some of the workers who are making the various materials to supply the forces fighting in Europe are so ill adjusted to the situation that even with one of the best managed munition manufacturers in the country the efficiency of labor has fallen ten per cent. since the war broke out, in spite of a tremendous rise in wages.

Cannot scientific analysis resolve the causes of this maladjustment, which threatens the life of our institutions? Cannot the engineering mind reorganize the human elements of production as it has already done with the mechanical and material elements to secure efficiency?

Unity of Purpose Is Needed

The most cursory engineering analysis of our production problem will show that unity of ideals and purpose is lacking between labor and employers. Labor sees no motive for securing maximum production, and consequently cannot be expected to work to that end. In the bare facts of our inefficiency with which everyone is familiar we see the results of this condition. A great proportion of our labor is foreign-born and does not speak English. A still greater proportion of it is yet in ignorance as to what is at stake in this war. Practically the entire body of labor is ready to believe that any methods adopted in the present emergency for securing the highest possible output per man will result in additional piling up of wealth for the capitalistic classes without any corresponding increase in the returns to the worker.

Compelling Motives for Production Lacking

It is evident that compelling motives for the worker to increase his production are lacking so long as these ideas and conditions are prevalent. It is equally obvious that compelling motives must be supplied if production is to be increased. The first thing is to make the worker, and especially the foreign-born and non-English-speaking worker, understand that this is his country, and that there will be a direct return to him for his patriotic help in winning the war by reason of the fact that this country will be made a better place for him to live in.

Especially if he is foreign born must he be given an opportunity to have a home where he and his family can be happy. His children must have equal opportunity in the schools. The idea that the non-English-speaking foreigner has been brought into this country with the expectation that advantage could be taken of his ignorance to force him to work for less than standard wages must be dispelled once and for all by honest treatment on the part of employers and of the entire English-speaking public. The foreign laborer must learn that he is wanted as an American and that he will receive the benefits of American citizenship without prejudice, in return for his support of the nation.

Practical Methods of Americanization

With fair treatment as a background, many practical methods can be applied to make loyal American citizens and productive workers out of the great mass of our foreign-born population. They must be induced first of all to learn English, either in adult classes at the public schools, where these are available, or in special schools conducted by employers themselves. It is good business for the employer to bring his employees up to their best and keep them there. Ignorance of the language in which directions are given, in which warning signs and safety notices are printed, prevents the development of efficiency and results in costly blunders. The use of a dozen different languages in preference to English by the employees of one plant splits the workmen into cliques, keeps alive feuds and grievances that originated in other lands, limits the effectiveness of American foremen, inhibits the development of loyalty to the industry or to the country, effectively prevents the worker from learning what the war is about and why this country is in it, and makes him an

easy prey for the propagandist. It is small wonder that the removal of this handicap has more than paid for the effort required, even where the instruction has been conducted in the employer's time and at his expense. And today it is no longer a question of greater returns to the individual manufacturer through increased efficiency and loyalty, but of increasing war production by whatever means till it outmatches that of the enemy. This is not to be accomplished with lukewarm or disloyal workers, and the winning of the war will justify any cost that is necessary to make our foreign labor English-speaking, the first step in making it American.

Some employers have already established the policy that no advancement can be expected by the foreign worker unless he becomes an American citizen. This policy is not discrimination, when the man of foreign birth who has become a citizen receives opportunity to rise in proportion to his ability. This nation cannot afford a large section of the population which does not intend to remain within its borders and become a part of it. American industry cannot do its part in this struggle with workers who do not think enough of this country to cast their lot with it. If America is not worth the price of citizenship to any element of our foreign labor, then American standards and ideals will not be worth defending to that element, and it cannot be counted on to do its part in the crisis.

Personal Contact Can Contribute Greatly

Noon-time talks, notices printed in foreign languages if need be, and posted, distributed or placed in pay envelopes, coupled with individual efforts on the part of the superintending force to convince employees of the advantages of citizenship, will be needed before we can root out prejudice against this country and its industrial system from among many of our foreign workmen. Prevalent ideas that the foreigner is not wanted here, that Americans are well satisfied to have his cheap labor for a time, with the understanding that he is allowed to save his "stake" and return with his unsanitary habits and his ignorance to the country that sent him forth, must be combated by intelligent and sympathetic educational work. To have permanent effect, such efforts must be kept up, and not permitted to slacken after a burst of enthusiasm on Flag Day. Employers must bear constantly in mind the fact that their plants cannot be contributing in full measure to the country's necessity until their foreign-born employees are all American in language, in ideals and in sympathy.

After the foreign worker has been taught our language, has learned our customs, has found that he can expect fair treatment and that he can aspire to a comfortable position in our social scale, he is ready to receive the inspiration of those ideals of which so much is said, to develop real sympathy with our form of government and to understand the possibilities that lie in democratic institutions. Until he has traveled this road, it will not be easy for the foreigner of Teutonic origin to see that the cheaply-won efficiency that is possible through the surrender of individuality to autocratic control is bought at the sacrifice of the greatest driving force of modern civilization—individual opportunity and initiative. Then he will understand why it is against the interests of mankind to have the German ideals of social organization imposed on the world's democracies, though these ideals are fully developed and their fruit of practical efficiency is in strong contrast at the present moment with the indifferent results achieved by undeveloped democracy.

Give the Foreigner Facts About the War

Practical ways of bringing this conception home to the worker of foreign sympathies all start from a common point—supplying him with facts which he can trust about the war. Explanations of why America is at war, and interpretations of what the events of the war mean to this country and its workmen can be distributed to them in the form of pamphlets. Before the foreigner has learned English, these must of course be printed in his language. After he and his family have learned to use the public libraries, they can be reached by inserting in the books they take out slips arousing their interest in other books which will give them a clearer idea of the war and their part in it. This method has already been found effective by the public libraries at Cleveland and Detroit.

Patriotic messages can be distributed in pay envelopes. Their effectiveness in poster form has been demonstrated during the Liberty Loan and Red Cross campaigns. Placards showing how the increased output of the plant is contributing to victory have proved one of the best forms of publicity. Notices of this sort can take a more practical turn by explaining to the foreigner the draft regulations and the application of other legislation which affects him. The foreign worker can be convinced in hundreds of ways that this country intends to look after his interests, that it offers the best opportunities he has ever had, and that it is worth defending with his best efforts.

Solid American Nation a Possibility

All this is essential, but if all of our labor is to be thoroughly American, thoroughly loyal to this country and to its industries in the present crisis and henceforth, more is needed. Labor must be convinced that such a thing as a solid American nation is possible; that conditions will be established under which manager, worker and investor can all join their best efforts, with assurance to the worker that he is receiving a full proportionate benefit from the things produced. In order that this shall take place a new confidence on the part of each of these three in the others must be born. Past grievances and prejudices must be sunk in the realization that an opportunity has come to make a great advance, with great profit to all concerned, in the management of industry. Owners and managers, for instance, must forget the background that prompts them to cheer, every time it is expressed, the idea that restriction of output is profiteering on the part of labor. Of course, workers must also forget past injustices that have led them to cheer suggestions of socialism or of anarchy. These human and very natural reactions must pass away with the understanding that the conditions which occasioned them have no place in the nation's life either at the present crisis or in the better democracy which we hope to win from it.

But who shall take the lead in changing these conditions, in establishing the mutual confidence which must

go with the change? Manifestly, the country can look for this initiative only to the investor and the manager, who is already coming to be the man with engineering training. With them lies largely the control of industries and communities, and they are in the stragetic position to take the first steps. In proportion to the vast number of workers the owners and managers are few, and it is much easier for them as a body to grasp the opportunity, to act with some unity of purpose and to create conditions which will make it easy to convince the worker of his responsibility and opportunity. Finally, those already in the saddle of industry have the advantage of scientific analysis of the situation, while the worker as a rule does not realize exactly what is lacking, cannot plan the steps which must be taken to supply it, and is in a far less advantageous position to take concerted action that has any chance of bringing the vitally needed increase in production.

It has been said above that the necessary preliminary to all progress in this direction is mutual confidence. Obviously, such confidence is destroyed by the merchant who sells to the worker inferior wares or needlessly increases charges. The community which permits such practices may be almost equally guilty with the merchant. Confidence is destroyed by corporations which declare excessive dividends on war contracts. Perhaps there are very few such, but each instance is widely published and is a stain on the present industrial fabric. Congress may be properly looked to for the solution of this problem through adequate taxation. Mutual confidence is destroyed by all forms of paternalism, in which must be included a great deal of well meant effort of the type referred to in the past decade as welfare work. Anything which gives the worker the impression that his "welfare" is being "looked after" in order to content him with less than his share of what he produces, or that appears in the light of giving him one part that he may produce ten parts additional for the owners, can hardly be expected to strengthen his confidence in his employers. All these things must be avoided.

Confidence May Be Fostered in Many Ways

On the other hand, confidence may be fostered in many ways, none of which requires abdication on the part of the manager or surrender on the part of the investor to the dictation of the worker. It is possible, for instance, to educate the worker as to the conduct of the enterprise in which he is engaged. He is capable of learning to what use the products of the industry are put, of what real value they are to the rest of the world, what it takes in the way of capital, material, management and labor to make them, what proportion of the total his own efforts represent and what effect on the total an increase in his personal production would bring about. Especially is this true of war production. With all this must go the assurance that better conditions for the industry and the country will mean better conditions for him exactly in proportion to his increased efforts. Obviously, the application of this method to the present patriotic occasion is to convince the worker that he holds a hand with the employer in a desperate game, that its winning means exactly as much to him as to his employer, and that the latter will receive nothing from it in which the worker cannot share.

Education of this sort has been successfully carried on by many establishments, so that the matter is no longer an engineering theory but an engineering demonstration. Some of them have thrown open their books to their employees, have instructed committees of workers in the methods of carrying on the concern and have shared its profits with the employees. When it has been demonstrated that individual production can be so easily doubled in many lines, it is evident that any purely selfish desire for increased personal returns which may remain with investors should prompt rather than retard efforts at industrial reorganization in this direction.

Mutual confidence may be further fostered by action calculated to convince the worker that those in control of the enterprise take an intelligent interest in making the conditions of his employment the best that are warranted by the state of the enterprise. Increased production has so often resulted from a policy of this kind that it is unnecessary even to outline its operation.

Must Take Interest in Workers' Problems

Most important of all, confidence on the part of the worker is inspired by the knowledge that manager and investor are directly interested in seeing him get along in the world. This does not include merely personal attention to the worker, with advancement wherever he proves capable of performing more important work. Least of all is it covered by mere increases in the money return to the worker from the industry. It does include properly conducted communities from which are barred all those who would exploit the worker or take advantage of his necessities. It includes opportunity for the worker to have a family in circumstances which are not a continual strain upon him, and under conditions where there is a satisfactory future in sight for his children. Efforts on the part of employers in this direction, however, if they are not to be mistaken for paternalism, must be directed toward giving the worker the necessary opportunity and knowledge to develop such things for himself out of his own resources.

The man in charge of one such effort, which has been carried on for some time with striking success by one of the largest coal operators in the United States, recently said at a public gathering, "I hate those words, 'welfare work.' I wish they could be taken from the language." Yet he has helped foreign-born coal miners to have gardens, has taught their wives to make and wear American dresses, has gathered their children in kindergartens, has stopped the disruption of their family life which resulted from taking "boarders," has created and satisfied a taste for many forms of social enjoyment, and has successfully accomplished a thousand and one things which would have been classed as paternalistic ten years ago. All of this, however, has been done by the workers from their own resources with nothing more than encouragement and education from the management.

The striking monument to this work is the fact that the mines of that company stand today as oases in a desert of labor unrest. They pay only union wages, they make no effort at profit-sharing or tying the em-

ployees closer to the conduct of the business, yet they have and hold the cream of the mine labor supply while others are struggling with high labor turnover and lowered efficiency.

This much can be done under present conditions by adopting only one of the tried and obvious methods of increasing confidence on the part of the worker. What, then, must be the opportunities that lie before practically every industry in America which sets out in a scientific way to make its workers an integral part of the enterprise?

No one need hesitate to make an immediate beginning in this direction for lack of specific application of these principles to his own labor problem. The means of engineering analysis are available to everyone. Expert help can be obtained from a dozen agencies. In the matter of educating workers to an appreciation of the seriousness of the war, methods, suggestions and personal assistance can be had for the asking from the Department of Labor. Assistance as to employment, production and management methods, in the form of advice, instruction and the time of technically trained experts, is being furnished to manufacturers by many branches of the Federal Government. There is hardly an industrial establishment whose weight, thrown into the scales for better local conditions in the communities where its workers live, would be without effect. Those who desire to encourage their employees in making homes, in making better use of their means, and in developing a more satisfactory home and community life, can obtain the services of experts in these subjects.

The time is made ripe by the urgent necessity for national defense of democratic ideals. The laborer is ready. The investor and manager are in a position to work changes with him that will result in unheard-of progress, both in winning the war and in building for the future. The means for starting the reorganization on a scientific basis are at hand. No employer will be less patriotic than he expects his men to be in the face of the present danger. The country looks to every one of them who has not done so to make this Flag Day the occasion for inaugurating a new policy which shall have as its immediate object the increase of our production to a point that cannot fail to turn the scales of battle in our favor.

Along the British Front by Light Railway

Experiences and Impressions of a Week's Study of the Narrow-Gage System at Close Range—How It Has Revolutionized Salvage

By Robert K. Tomlin, Jr.
War Correspondent of Engineering News-Record

It was in February, before the big drives on the Somme and in Flanders, that Mr. Tomlin spent a week studying the light railways along the British front. His story reached the British authorities for censoring just before the March drive. Nothing was heard of it for weeks, and it appeared that if the article was published at all it would be in the German technical journals. But the Boches did not capture it, and it has lately returned from the hands of the British censors. So interesting is Mr. Tomlin's narrative of his experiences and impressions in getting the story that this, with an account of what the light railways have made possible in the way of salvaging of material, is made the basis of the present article. A second article, setting forth how the railways are built, maintained and operated, will be published next week.—Editor.

LESS than a year ago the British Armies in France were carrying, weekly, about 12,000 tons of munitions and supplies over a system of "light railways" (60-cm. gage and 20-lb.-per-yard rails) involving a total trackage of less than 100 miles. Motor-truck, or lorry, transport over highways was, at that time, the main reliance for deliveries from standard-gage railheads to the front. Today the weekly tonnage on light railways has soared well into six figures, the track mileage into four figures, and during a period of about 10½ months the highways have been relieved of millions of lorry-miles of traffic.

For obvious military reasons I cannot make this statement more specific, but it will serve to indicate the really tremendous traffic development which has taken place along the British front. Light railways have already revolutionized transportation practice, and the end is not yet in sight. Far from resting on its present enormous mileage of 60-cm. track, British staff officers are calling for more mileage, more engines, more tractors, more cars. A year's actual test has demonstrated in the most convincing manner the supreme importance of the light railway in the conduct of modern warfare, for every 3-ton load hauled relieves the highways of one lorry. Even now, the British tonnage figures on light railways for successive weeks are showing regular jumps of 10,000 to 15,000—there had not been a break in the curve during the 17 weeks preceding my visit to the British front in February. In this article reference to tonnage is based on the long ton of 2240 lb., not our own short ton of 2000 lb. To the engineer these statistics, general as they are, will indicate the place which the light railway now occupies in the scheme of transportation in the war zone of France, and how the highways have been relieved of the heavy overload of traffic which demanded high tribute in materials and men for maintenance.

I have just returned from a week's tour along the front, where, thanks to the splendid hospitality of our British allies and the detachments of our own American railway troops which are operating in northern France, exceptional facilities were given me for observing the actual working of the light-railway systems from Flanders southward through the valley of the Somme. But before I get into the engineering details of my story, let me give a hasty outline of my trip.

British Official Photographs
THE BRITISH ARMIES, DURING THE PAST TWELVE MONTHS, HAVE LAID A TREMENDOUS MILEAGE

I was met at a certain railroad station by a British staff officer, and proceeded by automobile to British general headquarters, where I was introduced to the Director General of Transportation of the British Expeditionary Force. I spent the afternoon with a brigadier general, the D.G.T., who very kindly permitted me to inspect his organization charts and graphic records of the trackage and tonnage of the light railway system for all of the British Armies in France—charts on which the curves were ever mounting at steeper angles.

After tea, I met a brigadier general, the Director of Light Railways, who is responsible for the construction, maintenance and operation of the system along the entire British front; a captain of the Royal Engineers, a veteran of the Gallipoli campaign and the great drive in the valley of the Somme, who had been assigned to act as my guide during the trip; and the several department heads in charge of construction, operation, maintenance and repair. Then we proceeded to the field headquarters of a major general, Director of Light Railways for the American Expeditionary Forces, where we spent the night.

Getting away to an early start next morning in a British staff car, we reached an Army light-railway headquarters in Belgium and from there traveled by light railway through the Ypres sector, the superintendent of operation in this zone having ordered a special train run out toward the front lines for my benefit. We had about half completed our ride when an enemy airplane came soaring over the lines, evidently intending to attack an observation balloon which we had just passed. British aircraft appeared. Machine guns cut loose. Its petrol tank riddled by bullets, the Boche plane suddenly emitted a great cloud of black smoke. The framework caught fire. The flaming machine reeled about in a spiral for fully a minute, exhibiting remarkable stability, and then plunged downward, leaving a wake of fire.

Night found us at ———, where the buildings are in every conceivable stage of demolition from heavy shelling. The room we occupied in one of them was ventilated by two great gashes which shells had torn in the ceiling.

Next day we crossed into the territory of another Army, where the Assistant Director of Light Railways explained the workings of the operating control and train-dispatching systems. Our next stop was at the headquarters of the commander of one of the first American railway regiments to reach France. Outfitted with "tin hats" and gas masks, we ran by light railway, under the guidance of two captains, to within a little more than a mile of the front-line trenches, looping back again to camp; thence by automobile to British A.D.L.R. headquarters, where we were the guests of a major at dinner. Into a shell-ruined town for the night and away again in the morning for another Army area where a Canadian lieutenant colonel, formerly with the Union Pacific, showed me the workings of his light-railway system, which has the largest mileage of any in the British armies. Then with a major through a salvage yard, where all sorts of materials recovered from the territory from which the German armies were forced to retire are collected and made available for use by British troops. And so on, under the guidance of another major to two other detachments of American railway troops. The last leg of our field trip took us by automobile to ———, where we spent the night. In the morning I caught the train for Paris, leaving my conducting officer, for whom I had quickly developed a great liking, and who, for four days, had so cheerfully submitted to my steady bombardment of questions.

During this tour I made several trips toward various parts of the front on light-railway trains which British and American officers ran especially for my benefit. I estimate that I rode 50 miles or more by light railway and at least 500 miles by automobile, and I walked over a few miles of track. Most of our journey was through territory formerly occupied by German forces, and I had the pleasure of crossing and recrossing many sections of the old "Hindenburg line." It was a wonderful trip.

My first ride was behind a 20-hp. petrol-tractor. Starting from a point near the standard-gage railhead of one of the British armies, we bowled along over a fine straight section of track, but as we got nearer to No Man's Land curves became more frequent. The ground on either side was pitted with shell craters of all sizes, and through half-closed eyes the barren fields, with their mounds and depressions, looked like a choppy, mud-colored sea. And yet it is through areas of this sort that light railways must be built and kept to fairly level grades. In the early days, I was

OF LIGHT-RAILWAY TRACK ALONG THE FRONT, IN BOTH THE FORWARD AND THE REAR AREAS

told, it was not uncommon for a steam locomotive to get its boiler water from a shell crater. Now elevated water tanks are provided at various points.

We stopped our train to watch the progress of the air battle to which I have referred, and when we resumed our trip I began to notice the very thorough system of guide signs and warnings which the British have installed along their light railways. In addition to direction signs there were others such as "Unload Here for Siege Battery." One of the first signs to greet me as we got up toward the front was this:

If You Think Your Respirator Is Faulty Go to the Gas Hut and Have It Tested

Mine was new, so we dispensed with this formality. A little farther along, another white signboard with black lettering bore this legend:

Steel Helmets To Be Worn and Gas Respirators Carried at "Alert" Position Beyond This Point

There were other white signs along the route, little crosses of two painted sticks, here planted singly, there in groups of a dozen or more, signs which needed no legend to tell of the brave sacrifice which had been made in order that British light railways might run where German trenches used to be.

It was at a grade crossing in the shelled area, where an old highway and the light-railway line intersected, that a certain grim-humorist sign painter had outdone himself. It was in territory that might be upheaved at any moment by a high-explosive shell, where gas attacks were an every-day possibility, and airplane bombs a constant menace. Here, where tiny tractors passed occasionally, the arch wag had inscribed this legend:

DANGER—RAILWAY CROSSING

Much of the country over which I passed on this and subsequent trips had formerly been in German hands. "We're running light railways now," said a British officer to me, "where only a few months ago we were crawling forward on our bellies." I saw a number of enemy "pill boxes" along the light-railway line, concrete structures with walls 4 ft. thick. Some of these were built of molded blocks, while others, apparently, had been cast in place, heavily reinforced with steel. Here and there a branch would lead off to a gun emplacement, and the variety of camouflage at these points was almost unlimited. A most remarkable sight was the crater of an old British mine. The hole was, I should judge, nearly 300 ft. in diameter, and from 50 to 75 ft. deep.

It was on the section operated by an American detachment that I got closest to the enemy line. It happened to be a cloudy day and we passed around a loop which is about 3000 yd. from the first-line trenches. Part of the way a hill sheltered us, but running beyond it we were, for 15 minutes or so, under direct observation by German artillery.

"See that line of trees over there?" one of the officers asked. "The Boches are on the ridge just behind them." It had never occurred to me until then how slowly our train was running!

That our troops are not working in what might be termed a health resort is evident from a few excerpts from the weekly reports of an American officer which I was allowed to read. Here is one entry:

"On ———, while tractor was hauling cars of rations and water, gas shell struck ration car and derailed it. Another gas shell struck tractor as it was backing away, derailing it also. One British and three Americans gassed, but are recovering."

Farther on I read:

"Track blown out. While repairs being made track near by broken in three places by shell fire. Two men knocked down."

One of the surprising developments which have followed in the wake of the light-railway work is the salvage of material on old battlefields. Without light railways it was difficult, if not impossible, to collect and transport to the rear the equipment used in former activities. In one army area where I studied the salvage system—which, by the way, is of fairly recent origin—about 250,000 tons of usable material had already been recovered and shipped back for reissue to the British forces. All of this stuff was from ground which the Germans had been forced to relinquish. The principal products which the salvage forces had collected, as shown in one of the photographs, were timber from old German dugouts, rail, corrugated iron, barbed wire, chicken wire and expanded-metal trench

revetment, ties, duck-boards, old rifles, shell cases, clothing, tools of various kinds, stakes, hose, bolts and nuts—in fact, the thousand and one odds and ends which constitute the débris of battle.

A major in charge of a salvage dump which I inspected told me of the results of this work in his own area. "We are now getting thousands of timber setts from old dugouts and tunnels," he said. "In the past 10 days, for instance, we have recovered about 1600 tons of wire, and before the Cambrai 'show' we were responsible for 33,000 tons of recovered material which was sent forward for reuse by British troops." Timber is so exceedingly valuable at the front that special crews of tunnelers are organized and trained to recover it from old dugouts.

British Official Photograph.

THIS IS THE KIND OF MATERIAL THE SALVAGE FORCES RECOVER BY MEANS OF THE LIGHT RAILWAYS

At the dump where we happened to be, I was told that the weekly turnover of material averaged 1200 tons. On one day 3500 shovels were sent back to be reissued. Shell cases to the number of 12,000, each worth from seven to ten shillings, represented another single week's haul. Three hundred rifles is considered a normal week's return. Old rifles receive an oil bath and a cleaning before being shipped back. Old tin cans are a profitable source of solder. They are heated in a homemade furnace, itself made of salvaged material, and supply enough solder to keep a few large workshops in babbitt metal. The walls of the melting furnace are made of old petrol cans filled with sand.

The salvage organization is left very much to its own resources in the matter of its equipment. "Go out and find it," seems to be the motto. It recovers rail for its own trackage, and often must build its own cars out of the old trucks and timber brought in from the field. While most of the material from the field is delivered to the salvage dump by the light railways, some comes in by lorries. The dump itself is arranged for lorry delivery on one side, and light-railway delivery on the other. Material is all classified at the dump. Here one sees a pile of duck-boards, there a mound of wire, then some piles of shell cases, railroad ties, rails, etc. Through the middle of the dump a standard-gage railroad line runs for delivery to bases in the rear, where the material is put in serviceable condition for further use.

In the old days nobody paid much attention to the possibilities of salvage, and for a good reason; there was no way to recover material quickly and—the important point—with a low expenditure of man power. This condition light railways have changed. Into crater-marked regions where highway building would be a long and tedious operation, light railways can be extended without much trouble. With transportation facilities available the whole economic situation with regard to salvage on a large scale appeared in a new light, and the work now returns an excellent income on the comparatively small investment in labor.

[Another article, telling how the light railways are built, maintained and operated, will be published next week.—Editor.]

Special Level Rods for Highway Grading

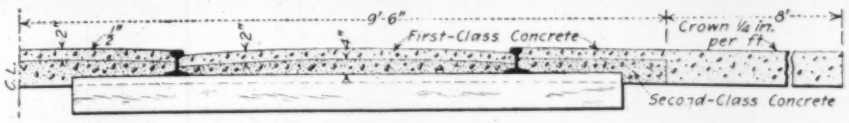
Inadvertently the name of the author of the article, "Special Level Rods Facilitate Light Highway Grading," published in last week's issue, p. 1085, was omitted. E. Earl Glass, of Monrovia, Cal., is the author.

Rolling Concrete Longitudinally Gives Good Roadway

Small Pipe Filled with Sand Rests on Forms and Is Pushed Along by Foot — Scheme Saves Labor of Four Men

By George Yavroumis
Assistant Engineer, Public Service Commission for the First District, New York

MUCH advance has been made during the past year in the use and development of the roller for finishing concrete roadways. Articles descriptive of several types of these rollers, as well as the application of the belt method of finishing highway concrete, have appeared in several issues of *Engineering News-Record*, and it is felt that the type of roller developed by the writer while supervising New York State road construction at East Union, N. Y., is worthy of description, since the results obtained were so satisfactory and the roller itself was so simple in design. It consisted of a length of 2-in. wrought-iron pipe and successfully replaced the cumbersome screed, the back-breaking float, and the bulky "bridge."



DISTANCE FROM TRACK TO SIDE FORM SPANNED BY TWO-INCH PIPE ROLLER

A one-course concrete roadway was being built at East Union in accordance with the New York State Highway Department standard for 1:1½:3 concrete. The roadway itself was 35 ft. wide, the middle 19 ft. being two-course concrete paid for by the street railway company, whose double tracks occupy the central portion. The contractor commenced the work with the usual paraphernalia, using two men to spread the concrete as it came from the mixer chute, three men to help the spreaders and work the screed, and one man who was occupied with the hand float continuously, although he had to work from one to two hours overtime and was occasionally assisted by the foreman. After a lot of argument and several days' work with the old implements, the writer finally persuaded the contractor to use a roller. Although an attempt was made to secure a length of 6-in. wrought-iron pipe, an experiment was finally undertaken with a section of 2-in. pipe taken from the water pipe line and filled with sand. The results were fully satisfactory—so much so that no further attempt was made to secure the 6-in. pipe.

With this improvised roller it was found that two men could do all the work of spreading and finishing the concrete. As the batch was deposited upon the subgrade it was spread with hoes a little high and then rolled into shape with this small pipe, which rested on the outside form of the road proper and the outside rail of the track. No attempt was made to attach a handle to this roller, it being found possible to push it ahead with the foot. Occasionally too much concrete would accumulate in front of the roller and it would have to be hoed away; or, conversely, when not enough concrete had been deposited, more would be placed. There was plenty of time, even with the decreased labor force, to roll the concrete several times, or until all the surplus water was squeezed out. If sufficient care was taken in this operation, the resulting surface did not require any further treatment. It was rough enough when opened to traffic not to require any brooming, and the slight corrugations which resulted from the use of the small pipe seemed to afford an excellent foothold for horses and to be hardly noticeable under motor-car traffic.

Later on an attempt was made to use an 8-in. wrought-iron pipe in place of the 2-in. pipe, and while it seemed to compact the concrete with less rolling, it had the disadvantage of requiring greater care if deep corrugations were to be avoided. Furthermore, it seemed to climb over excess concrete instead of pushing it ahead, as was the case with the roller of smaller diameter. Hard to handle because of its weight, the larger roller had a certain advantage when the concrete was mixed relatively dry, but if the concrete was plastic enough to slide down the chute there was no advantage that would compensate for its extra weight.

The success of the first 2-in. roller induced the contractor to procure rollers for finishing the crowned portion between the rails and between the two tracks. These rollers were failures mainly because they were not heavy enough. If the concrete was wet enough to be shaped by the roller, it would lose its shape immediately after rolling, while if it was stiff enough to hold its shape after rolling, the roller was not heavy enough to pack it to shape—the roller being turned out of an 8-in. square oak stick.

The Frank Sherman Contracting Co. of Oneonta was the contractor, H. E. Smith, division engineer, and the writer engineer in charge for the State Department of Highways.

Rulings on Sewage Irrigation

Regulations issued by the California State Board of Health to govern the use of sewage for irrigating crops restrict the utilization to products not eaten uncooked by human beings. For vegetables which are used in the cooked state, sewage may not be applied within one month of harvesting, except that special permission may be given to irrigate products intended solely for canning. By this ruling, garden truck, berries, tomatoes, celery and lettuce may not be irrigated except when intended for commercial canning; while green corn, cabbage, cauliflower and asparagus must not be irrigated within a month of harvesting. Trees bearing fruits or nuts may be watered with sewage, but windfalls and fruit that may be lying on the ground must not be used.

Cantaloupe, watermelons and cucumbers may be so irrigated, provided the sewage does not come in contact with the vine or fruit. Stock foods, such as alfalfa, fodder corn and cow beets may be watered with sewage, but milk cows must not be pastured on the land while it is moist with sewage.

Designing Wall Beams in Concrete Flat-Slab Buildings

Reinforcement Details Governed by Construction—Should Have at Least Partial Continuity —Appearance Important

By Albert M. Wolf
Principal Assistant Engineer, Condron Co., Chicago

FLAT-SLAB reinforced-concrete buildings have the advantage of maximum window space between floors and wall columns. In some buildings this whole area is occupied by sash, but in cases where so much window area is not wanted or where there are no windows at all the necessary spandrel beams carrying the wall are extended above the floor, permitting where required a clear window space up to the ceiling. The various ways of treating such beams, their structural design, location and exterior appearance are the subject of this article.

In four-way flat-slab construction it is the usual practice to assume that spandrel beams, which are in general required, carry one-third of the load on the adjacent panel. This is done to make allowance for the distribution of loads on the spandrel by the diagonal belts of bars. In a two-way system for square panels one-quarter of a panel load will come upon the spandrel in addition to that of the spandrel wall. In general, the width of the main exterior belt of reinforcing bars in the flat-slab portion of the spandrel girder will be at least one-half that of the interior belts and therefore strong enough to carry the floor loads, but not always the additional spandrel wall load. This latter must therefore be carried by the raised spandrel beam which must be designed to carry at least that load and preferably also a small additional amount of the adjacent floor load (about 5 to 10 per cent. of panel load depending on the type of reinforcement, the lower limit for two-way and the upper for four-way reinforcement) the beam will tend to carry owing to its increased stiffness as compared with the flat-slab portion. This method of design gives safe results, since even if the spandrel girder and the flat slab adjacent to it, due to the difference in amounts of deflection of the two portions, should be separated by a longitudinal crack for the full depth of slab, which is improbable, each part as a separate unit would be able to carry the load coming upon it.

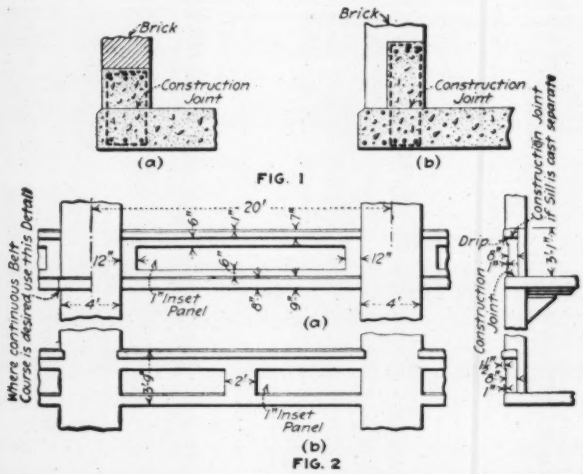


FIG. 1. EXPOSED AND COVERED SPANDREL BEAMS CARRYING BRICK WALL

FIG. 2. HOW TO DESIGN OUTSIDE OF SPANDREL GIRDERS SO AS TO PRESENT ARTISTIC APPEARANCE

The general method pursued in the construction of raised spandrels in connection with flat-slab construction is first to pour the slab or lower portion, and when this has hardened the upper part is built. This feature should therefore be carefully considered in design, as hereinafter suggested.

Such girders should in all cases be designed as continuous or partially continuous beams (depending on whether the span is interior or exterior) since being fixed or partially fixed at the ends by the columns, cracks will occur at these points in the top portion of girders unless reinforcement is provided to care for the stresses developed by the continuous action of the various spans. Failure to reinforce spandrel beams in this manner accounts for the unsightly and dangerous looking cracks appearing on the faces of spandrel girders in many concrete buildings.

Just what bending moment coefficients shall be used in the design of beams in which the portion carrying the bottom reinforcement is not cast integral with the upper portion is rather difficult to say from a theoretical basis. Practically, however, such beams or girders are not as strong in all respects as if cast in one piece. Experience has shown that for a series of more than two spans the use of a bending moment coefficient of $\frac{1}{11}$ as a basis for determining both positive and negative moments for interior spans and $\frac{1}{9}$ for exterior, will give entirely safe results, with the span taken as the clear distance between colums. In any case the extra amount of steel involved is so small that conservative assumptions as to moments are justified if unsightly cracks are prevented thereby.

The first type of raised spandrel girder, of comparatively small depth, to be considered is the one carrying a brick curtain or spandrel wall with the outside face of the beam exposed or covered by brickwork or terra cotta as shown in Fig. 1.

If the girders project only a few inches above the floor line they may be poured without difficulty at the time the slab is poured, but if they contain a fairly large amount of concrete they cannot be placed integral with the floor without considerable additional expense for forms to prevent the concrete from being forced out at the bottom of the form at the level of the top of slab by the weight of concrete in the beam box above. To obviate this difficulty the common practice is to pour the portion of the girder above the floor slab at the time the columns for that story are poured. Where this is done, it is highly essential that the girders be so designed that the two portions poured at different times act to all intents and purposes as a single unit. The full value of the girder probably cannot be developed in any case, but by designing with some additional strength to allow for some loss of carrying capacity due to the construction methods, satisfactory results can be obtained. To tie the two parts of the girder together, a goodly number of stirrups should be placed in the spandrel beam at the time of pouring the bottom or slab portion. These stirrups should be put in at

fairly close spacing and be bent over the top reinforcing of the beam for anchorage. It is highly essential that enough stirrups be provided to keep the stresses induced in them by hanger action very low, so as to limit the deformation and prevent cracks forming horizontally at the junction of the two parts in the middle of the span.

The main reinforcing in beams of this type should also be of a character that will tie the top and bottom of the beam together. This can be accomplished by bending up one or more bars near each support, so as to pass from bottom to top portion and extending far enough beyond the column to act as reinforcement against negative moments. Then also some straight bars should be placed continuously in the top of the spandrel around which bars the stirrups may be anchored. This will aid materially in making the two portions of the beams act as one. If the upper part (above the slab) is considerably deeper than the slab it is always well to put in at least two horizontal bars in the bottom of the former, an inch or two above the top of the part previously poured. This will allow the upper part of the beam to act as a load-carrying member should it under any circumstances become separated from the lower part where the main reinforcement to resist positive moments is placed.

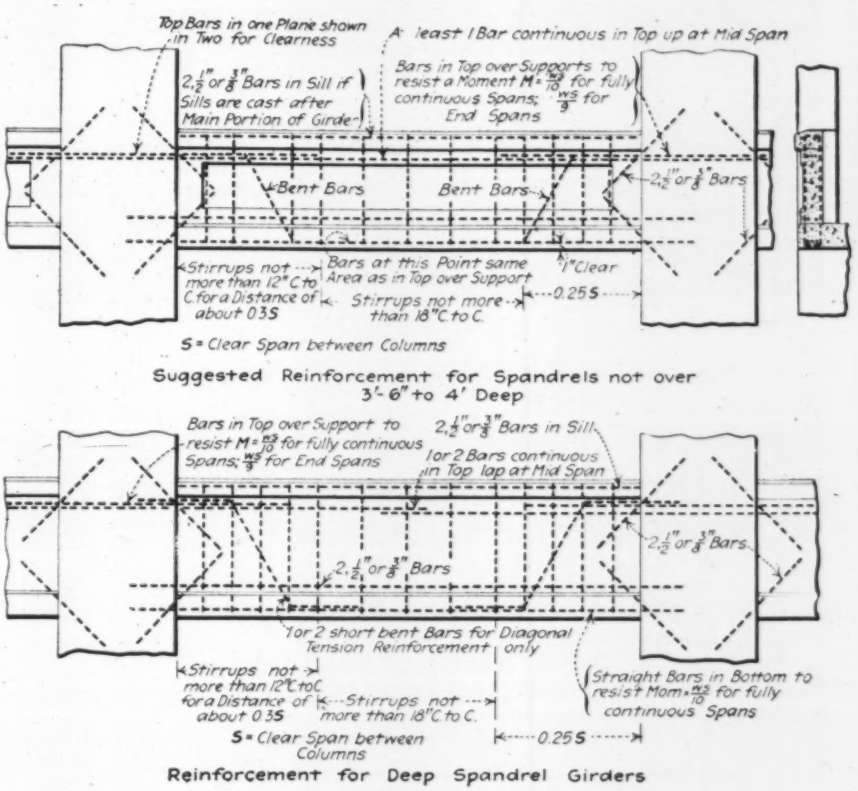

Top Bars in one Plane shown in Two for Clearness
At least 1 Bar continuous in Top up at Mid Span
2, 1" or 3/8" Bars in Sill if Sills are cast after Main Portion of Girder
Bars in Top over Supports to resist a Moment M = ws²/10 for fully continuous Spans; ws²/9 for End Spans
Bent Bars
Bent Bars
2, 1" or 3/8" Bars
Stirrups not more than 12" C to C for a Distance of about 0.3S
Bars at this Point same Area as in Top over Support
Stirrups not more than 18" C to C.
1" Clear
0.25S
S = Clear Span between Columns
Suggested Reinforcement for Spandrels not over 3'-6" to 4' Deep
Bars in Top over Support to resist M = ws²/10 for fully continuous Spans; ws²/9 for End Spans
2, 1" or 3/8" Bars in Sill
1 or 2 Bars continuous in Top lap at Mid Span
2, 1" or 3/8" Bars
2, 1" or 3/8" Bars
1 or 2 short bent Bars for Diagonal Tension Reinforcement only
Stirrups not more than 12" C to C for a Distance of about 0.3S
Stirrups not more than 18" C to C.
Straight Bars in Bottom to resist Mom. = ws²/10 for fully continuous Spans
S = Clear Span between Columns
0.25S
Reinforcement for Deep Spandrel Girders

FIG. 3. DETAILS OF REINFORCEMENT FOR SHALLOW AND DEEP SPANDREL WALL GIRDERS

The next type of spandrel beams or girders to be considered is that in which the concrete beams raised above the floor serve as spandrel walls below windows, such beams in general being from 2 ft. 6 in. to 4 ft. in height above the top of slab. With such construction it can readily be seen that the design features which must be taken care of are not only the load-carrying capacity of the beam, but also the effects of expansion and contraction, and the surface appearance after completion. In most cases the deep spandrel will be more than ample to carry the load coming upon it, but the other conditions mentioned require that considerable care be used in detailing.

If the floor slab will carry the load without the aid of the spandrel, a construction joint should be formed at the top of the slab, slots left in the columns to receive the spandrel which should be poured after the floor above is completed. Such curtain spandrels should be from 6 to 9 in. thick, depending on span between columns, and reinforced with about 0.3% of horizontal steel near outer and inner faces to provide for wind stresses and expansion and contraction stresses. The horizontal reinforcement should not enter the columns, as this will tend to develop continuous action. The keys or slots in columns will hold the ends of the spandrel curtain and if desired, vertical stubs can be embedded in the floor slab when it is poured to aid in tying the spandrel to the floor. With this type of spandrel it will be well to provide a continuous slot or offset in the top of slab under the spandrel curtain in addition to, or in lieu of, the vertical bars to key them to the slab. This type of spandrel is easily built and since it can be put in after the main concrete work is finished, more attention and care can be given to the pouring, with the result that a better finish for the exposed concrete can be obtained.

In the ordinary type of reinforced-concrete spandrel girder construction the concrete columns are exposed and they together with the raised spandrel girders, from 8 to 12 in. thick, form the exterior building walls. The usual method of construction employed is to pour the floor slab and after this has hardened the spandrel girder and column forms are erected, the reinforcement placed, and the girders concreted. This means that a construction joint is formed in columns at the sill line of the girder (Fig. 2) but in general the concrete is allowed to set only sufficiently to insure its remaining in place under the head of fresh concrete in the column forms above the level of the sill.

The facts mentioned regarding the methods employed in constructing spandrel girders and exterior columns should be borne in mind when detailing them, and proper provision made in the design to meet the conditions imposed. The construction joint formed at the top of the slab can be rendered inconspicuous by setting

the raised spandrel girder back 1 to 1½ in. from the face of slab. This treatment also will give a better architectural appearance than a plain flush spandrel. The upper edge of the floor slab should be beveled off and the spandrel girder paneled in a simple manner to relieve the monotony of the plane surface. Suggested methods of treating exposed spandrel girders are shown in Fig. 2. A plane surface without reveals at columns, offsets at floor lines and some sort of paneling is anything but artistic. Such a girder may be cheaper to build so far as form work is concerned, but it is extremely difficult to obtain a satisfactory surface finish. The construction joints, which naturally are rough and undulating where no offset is provided, are bound to assert their presence even after cement plaster or brush coat treatment and can only be effectively hidden by costly bush-hammering, sand-blasting or tooling. On ordinary buildings such treatment is out of question from an economic standpoint, and the method previously described should be given preference in the case of industrial buildings.

How to Reinforce Spandrel Girders

From the foregoing it can be seen that methods of construction employed are the ruling ones in the design of raised spandrel girders. Since the floor slab and the raised girder or beam are cast at different times, it is manifestly necessary that some type of reinforcement be used that will tie the two portions together. This can be accomplished by the use of plenty of vertical stirrups anchored in the floor slab and by bars bent up from the bottom of the portion cast with the slab to the top of the girders over the columns. The stirrups should be spaced to meet the conditions mentioned previously under spandrel girders of the first type, but for practical reasons it will be found unwise to increase the spacing much over that shown in Fig. 3 unless the thickness of girder is increased. If the spandrel is very deep, care should be exercised in the arrangement of bent bars, for it will be found that in order to get the bars in the top of girder soon enough to act as negative reinforcement on both sides of column they must be bent up at a fairly sharp angle (60° with horizontal) at quite a distance out from the support. This means that careful attention should be paid to the location of bends so that the reinforcement will not be taken from the bottom portion at points where it is still required to provide for the bending moments present. In general it will be found advantageous to provide one or two short bent bars at each end of a spandrel girder if deep (Fig. 3, below), in addition to the straight bars required in the bottom to care for the positive bending moment, these bars being used as diagonal tension reinforcement only, with sufficient anchorage in top and bottom of girder. It is also good practice to place at least two bars continuous in the top to serve both as negative reinforcement and anchorage for stirrups. If the girder is not too deep (Fig. 3, upper) some of the main reinforcing bars can be bent up into top at ends, thus acting as negative reinforcement over the supports as well as diagonal tension reinforcement.

To prevent the formation of diagonal shrinkage cracks at the junction of top and bottom of girder and columns some bars about 5 ft. long (½ in. or ⅝ in. diameter), depending on the thickness of the girder, should be placed diagonally at these points in both faces of the spandrel, one-half of the length of bars being embedded in the columns and the remainder in the spandrel girder. These bars are shown in Fig. 3.

If the sill is cast at the same time as the rest of girder the top reinforcement should be concentrated therein, but if not the main reinforcement should be below the under side of sill; that is, the sill is not assumed as effective, but some continuous reinforcing should also be placed just below the top line of sill to act as temperature reinforcement and prevent cracks therein. The sills are generally cast after the rest of the girder has been poured, for the reason that better results can be obtained in erecting the steel sash. By casting the sill after the sash are blocked up in place all trouble of making the sash conform with the irregularities of the notch left in previously cast sills is avoided and a more finished and workmanlike job obtained. The sill should overhang at least 1 in. and preferably 1½ in. to 1¾ in. beyond the face of spandrel, with a drip formed on the under side of projection to keep water from running down the face of girder and discoloring it. If the floor slab is made to project beyond the face of the girder for a distance of 1 in. to 1½ in. as a belt course, the sill should project a trifle further than the slab to prevent the drip from the sill striking the belt course.

Separately-Cast Continuous Spandrel Girders

An ingenious method of design has been used by the Aberthaw Construction Co. which is said to possess all the desirable features of monolithic construction, and at the same time allows casting the upper portion of the girder after the columns above have been concreted. Rebates or pockets 2 in. deep are left in the columns to hold the ends of girders, and the top or negative reinforcement of the girders is grouted into pipe sleeves passing through the columns. These sleeves are set when the columns are poured. In the bottom portion of the girder, which is cast with the floor, closely spaced stirrups and the positive reinforcement are placed in the same manner as for the types previously described. When the negative reinforcement is properly grouted into place and the panel cast the girders are said to be practically as strong as if cast monolithically.

Baltimore's Paving Work

Sheet asphalt was used almost exclusively for paving in Baltimore last year, according to the annual report of R. Keith Compton, chairman and consulting engineer of the paving commission of that city. In a number of cases where old granite blocks were taken off the streets they were recut and relaid in an improved manner in track areas, or else were hauled to and paved in streets around the freight territories and around the waterfront, and also in heavy traffic alleys in the wholesale section. This recut granite, Mr. Compton states, makes an excellent pavement. For the alley work cement concrete was used to a very large extent where the traffic was light and the alleys were virtually free from water Where the traffic was heavier and a considerable amount of water existed, shallow vitrified blocks were used.

Manufacturers of Northern Ohio Make Industrial Survey

Government Suggests Voluntary Organization as Model for New Plan for Listing All War-Work Possibilities

MANUFACTURERS and business men of northern Ohio have voluntarily organized to make a survey of the war-work possibilities of all industries in their region. By the creation of the new resources and conversion section of the War Industries Board, the Government has undertaken to make the investigation national. Charles A. Otis, recently president of the Cleveland Chamber of Commerce and a prime mover in the industrial-survey plan, has been made chief of the new section, and has suggested the Cleveland plan as a model for all of the other 19 regions. What has been known as the Cleveland War Industries Commission receives official status under the resources and conversion section.

Mr. Otis describes the commission's plan in a circular addressed to chambers of commerce in the various regions. The Cleveland region is coextensive with the "Cleveland District" designated by the production division of the Ordnance Department, and comprises 54 counties in northern Ohio and 3 in northwestern Pennsylvania. The commission is an organization of manufacturers formed primarily for the purpose of helping win the war, by mobilizing industry within the region to determine what is produced and what capacity is available, and places information at the service of the purchase and supply agencies of the Government, thus providing not only the equipment but also the personal touch between the officials at Washington and the manufacturer which is now frequently lacking.

Because it was felt that detailed knowledge of the industrial output and resources of the region could best be supplied by local manufacturers, the region was divided into eight subregions. As the map shows, an important industrial city in each subregion was designated as center, these cities being Toledo, Lima, Columbus, Mansfield, Canton, Cleveland, Youngstown and Erie, Penn. Each subregion has a local war industries commission which coördinates all industry within its territory. The governing body for the region is an executive committee, composed of the eight chairmen of the subregional commissions.

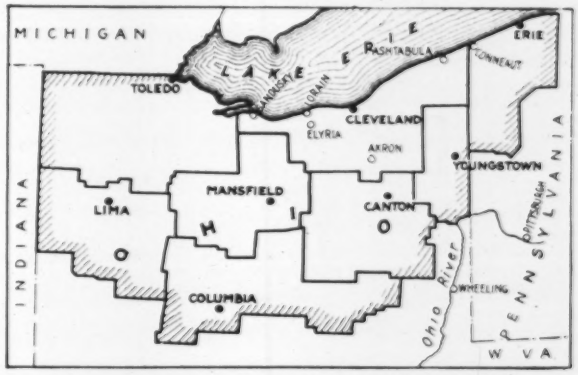
Industry is divided under the following classifications of operations and products:

Castings (a pouring operation)—subdivided into aluminum and brass; gray iron; malleable and steel.

Forgings and Stampings (a pounding operation)—subdivided into drop forgings (light and heavy); gun forgings; shell forgings (large and small); stampings (heavy and light) and sheet metal workers (heavy and light).

Machinery and Machine Products (a cutting operation)—subdivided into electrical appliances; machinery; machine shop equipment; specialties, and bar metal products.

Rubber Products—subdivided in solid tires; pneumatic tires, tubes and accessories; clothing and footwear; mechanical goods; balloon and airplane fabric; medical supplies; gas masks, and hard rubber.



CLEVELAND DISTRICT HAS EIGHT SUBREGIONS

Clay Products—subdivided into chemical stoneware apparatus; sewer pipe (hollow tile); insulators; common stoneware (tableware); conduits, and brick (fire, paving and building).

Chemicals, Oils and Paints—subdivided into oils (refineries and grease manufacturers, and jobbers); paints (paint division, varnish division, shellac division and dryers and thinners division), and chemicals (acids, fertilizers and industrial chemicals).

Textiles and Clothing—subdivided into knit goods; shirts and overalls; sewing-machine products; uniforms; garments; caps and hats, and woolens.

Wood and Leather—subdivided into paper boxes; wood cases; leather; truck bodies, and mill work.

Engineering—subdivided into plant survey; estimates; tools, jigs, gages, etc., and production.

Automotive.

In each subregion a chairman who is the leader in his line of industry is placed in charge of each classification. These chairmen form the executive committee in each subregion, which is the governing body within the subregion and is represented on the region's executive committee, the main governing body, by its chairman. Each chairman of a classification makes his own subclassifications. If the subclassification is a large one, the subchairman has a committee large enough to enable him to report promptly in detail the capacity available in all plants in his subclassification.

A chart has been prepared with the classifications and subclassifications shown horizontally and the subregions shown vertically. The Cleveland subregion is further divided into seven parts designated by the cities shown on the map. Names written into the chart indicate that in the Cleveland subsection chairmen and subchairmen for all of the classifications and subclassifications, except those under rubber products and clay products, have been designated, and that in the Akron subsection chairmen have been selected for all classifications except textiles and clothing.

Questionnaires, applicable to each classification, have been sent to every factory. The chairman of each classification has drawn his own questionnaire. The questionnaires are in triplicate form, one copy being kept by the subregion's executive committee, one by the chairman of the classification and one by the sub-

chairman of the subclassification. Knowledge contained in the questionnaires is, therefore, in the hands of everyone to whom it is of interest, and this knowledge is further supplemented by the first-hand knowledge of the subject of the chairmen, subchairmen and committees.

Voluntary contributions from industries, ranging from $25 to $250, assessed according to the size and importance of each company, have furnished funds to carry on the work. Every manufacturer is classed as a member of the commission in each subregion, whether he contributes or not.

It is now possible in the Cleveland region, states Mr. Otis, to place Government inquiries for war material into the hands of men thoroughly familiar with local conditions and get prompt reports concerning capacity available. The combined reports from the War Industries Commissions in the subregions give the capacity in the region. Under the plan to be followed by the newly created Resources and Conversion Section, inquiries will flow from the War Industries Board to the regions, where detailed information will be secured by means of the regional organization, and this information will then flow from the regions to the supply and purchasing officers of the Government.

"I think it is obvious to every business man in the country," concludes Mr. Otis, "that the physical equipment of a shop is not as important as the personal element. In the Cleveland region the manufacturers are developing new initiative and finding themselves industrially by closer contact. Manufacturers have learned that many products are being made near by of which they had been uninformed. Many benefits will come to us through regional organization as soon as we get together in this effort to win the war. These organized districts, working with one another, cannot but be beneficial to the entire financial and industrial structure of the country. I bespeak your hearty assistance in organizing your region, under the 'Cleveland Plan' which has been approved by the War Industries Board."

May Build Concrete Ship in Floating Drydock

Among the many novelties suggested for the construction of concrete ships is the use of a floating drydock as the ways on which the ship is built. A number of schemes of this sort have been put forward although none has so far been put into execution. It is assumed in each case that the outer forms may be permanent and movable from a fixed sidewall just sufficient to release the hull and to permit adjustment to varying shapes.

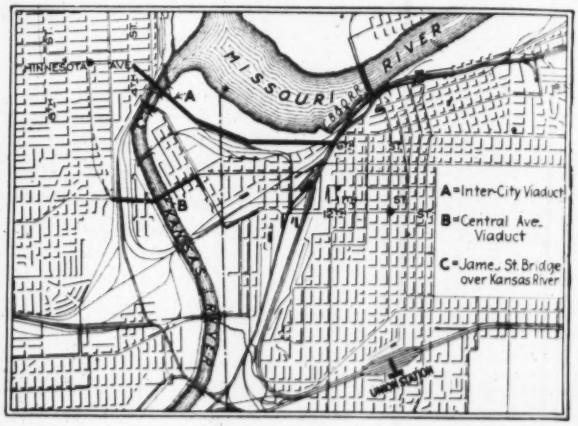
The saving in the proposed plan lies mainly in the ready reuse of forms, but an additional claim of merit is the ease and safety with which the concrete ship may be launched.

Because of the absence of the usual strains of launching, avoided by the easy letting down of the ship by the sinking of the dock, it is also asserted that launching can take place at an earlier date, with no damage to the greener concrete. This of course will increase production over a long period.

Cities Plan to Purchase Viaduct Across Kansas River Valley

THE municipalities of Kansas City, Mo., and Kansas City, Kan., are considering the purchase of the privately owned Inter-City Viaduct, the only high-level route for both street car and vehicular traffic from the bluffs on the Missouri side to high ground on the Kansas side. The viaduct, which was opened to traffic in 1908, crosses numerous railroad yards, the Kansas River and city streets. Low gradients of the approaching streets make it a splendid trafficway between the two cities.

The viaduct extends between Sixth St. and Broadway, in Kansas City, Mo., and Fourth St. and Minnesota Ave. in Kansas City, Kan., a distance of 8500 ft.; it has a branch near Mulberry St. which meets the street



THREE CONNECTING ROUTES, KANSAS CITY

grades at Sixth and Hickory Sts. The structure is of steel column-and-girder type, and has concrete floor slab.

Division of the deck width into a vehicle roadway and an independent street-car space along the north side of the deck makes the viaduct unsymmetrical throughout. The roadway is 38 ft. wide east of the Hickory St. approach and 30 ft. wide west of that point.

The viaduct did not prove a profitable investment. When the street railway company went into the hands of receivers, in 1911, the latter declined to pay the viaduct tolls and routed the cars over the old lines. As these lines are not only much longer (by as much as 4000 ft.) but also have several railroad grade crossings, traffic has been seriously inconvenienced by the abandonment of the viaduct. Agitation to purchase it is therefore natural. The facilities for street traffic between the two cities are now seriously curtailed by the rebuilding of the Central Ave. viaduct, the completion of which will require a year or more. The three direct routes (see the plan) are by way of the Inter-City and Central Ave. viaducts and the James St. bridge. Now that the Central Ave. viaduct is closed the James St. route, which crosses many railway tracks at grade, is the only free route. A purchase price of $1,800,000 for the Inter-City viaduct is now under consideration. The construction cost was about $3,000,000.

Federal Ships Erected by Derrick Travelers Built for Long Service

Problem Studied on Basis of Bridge-Erection Experience—Derricks of Pillar-Crane Type—Low Stresses and Special Bearings for Reliability—Gantry Truck Details From Shop Traveler Practice

SHIPBUILDERS and bridge erectors worked jointly on the problem of the erection of the 9600-ton steel ships which the Federal Shipbuilding Co., a subsidiary of the United States Steel Corporation, is constructing at its new yard on the Hackensack River just west of Jersey City, N. J. With fabrication of the ship in distant bridge shops, an erection problem quite different from that encountered in usual shipyard practice was presented. The work to be done was studied from a new point of view, utilizing knowledge drawn from both shipyard and bridge practice.

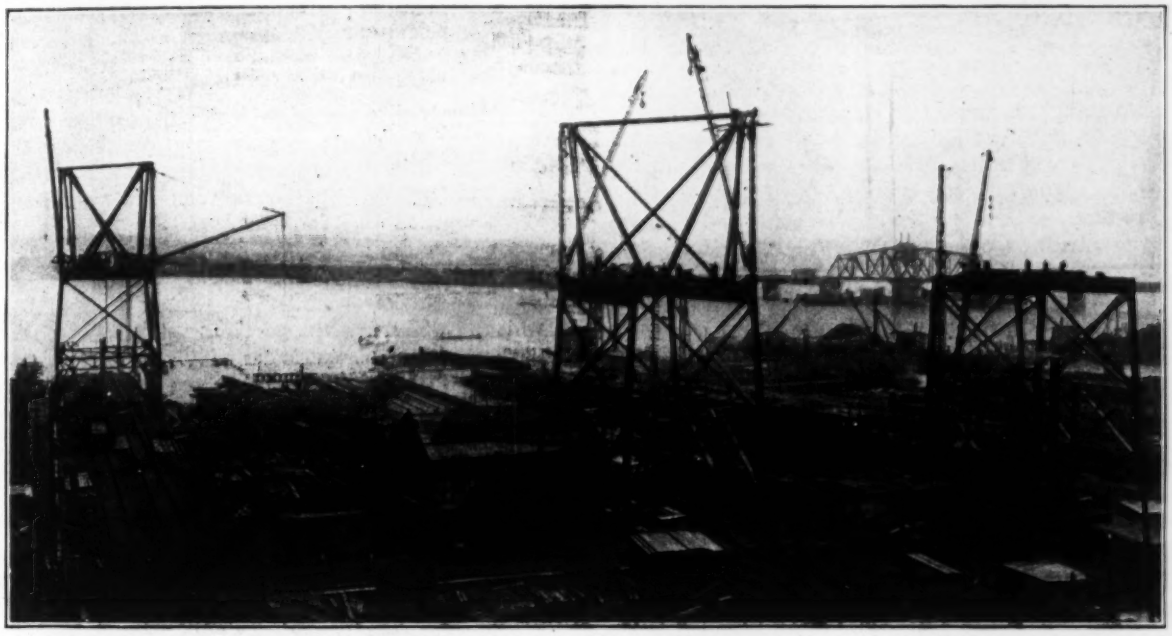


FIG. 1. SHIP PARTS HANDLED FROM CARS BY DERRICKS ON GANTRY SPANNING TRACKS BETWEEN WAYS

The value of the flexibility of operation inherent in the use of traveling cranes was strongly appreciated from the beginning. The employment of shipway travelers of any of the normal types was not suited to the conditions, however. Quick construction and easy repair and replacement of parts, under even the worst conditions of the supply market, were vital considerations. Therefore a type of machine was evolved which utilizes stock material and standard machinery, does not involve the use of special patterns or parts difficult to machine, and employs rope sizes and similar equipment that will always be obtainable. Field erection practice afforded the best example of the adoption of hoisting equipment of universal type. The derrick and the standard hoisting engine thus became the central elements of the machine, and a gantry support supplied the traveling feature.

The general conditions of location and layout governing the design of the erection equipment are represented in the plan and sectional sketch, Fig. 2. Shipways being spaced 135 ft. c. to c., there is about 50 ft. clear width between sides of the berths, accommodating two railway tracks on which the ship material is brought in, and gangways alongside. The ship to be built is 410½ ft. long over all, 395½ ft. long between perpendiculars, has 55 ft. molded breadth and 34 ft. 11 in. molded depth. About 2600 long tons of steel go into its structure. Most of the pieces brought in to be assembled on the berth weigh less than 5 tons each, but a few parts of 8 to 15 tons each have to be placed.

The number of hoisting hooks needed for reaching the maximum rate of construction was estimated by judgment based on experience in erecting bridge steel. The final conclusion was that two hooks per ship could handle all the material that it was possible to place and rivet up, if each hook covered all parts of the berth and was able to take material from either of two tracks. To meet all possible future conditions, however, provision was made for doubling the number of derricks when desired, at slight additional cost, giving four hooks per ship.

Many crane types were studied with respect to their applicability to these conditions. Cranes of the rotating hammerhead type and of the gantry bridge type were considered favorably, as they have made excellent records in shipbuilding practice. The importance of early delivery decided against them, however. Contractors'

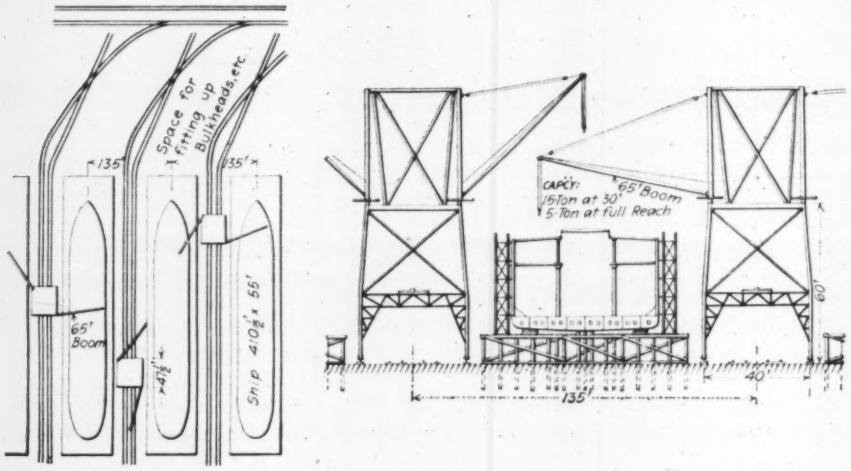


FIG. 2. EVERY PART OF BUILDING BERTH COVERED BY TWO HOOKS. TWO SUPPLY TRACKS PER WAY; EACH DERRICK HOISTS FROM TRACKS UNDER ITS GANTRY

hoisting engines were the only lifting machines in stock, and this fact ultimately led to the choice of a crane type combining derricks with a longitudinally traveling support.

The machine is a four-post gantry 40 ft. wide, spanning two tracks with ample clearance and carrying two 15-ton steel derricks, stepped 60 ft. above the rails. The gantry is built strong enough to carry four derdicks, but only two are installed, over diagonally opposite legs. The booms are 65 ft. long and cover nearly the full width of the ship. The 15-ton lift is limited to 30-ft. reach; at full-length reach the capacity is 5 tons. The maximum capacity will be needed only once or twice in the construction of a ship, as all parts to be erected, with a few exceptions, come within the 5-ton limit. Normally, the load line will be reeved through a single-sheave lower block (giving a three-part hoist), to get maximum lifting speed. When the few heavy lifts are to be made a three-sheave lower block will be substituted, and the line reeved to give seven parts. However, as the hoists are driven by direct-current series motors, the speeds will adjust themselves to the loads handled, in a measure.

All parts of the rigging are designed for the use of ⅝-in. wire rope, but in order to reduce rope wear the sheaves were made 4 in. larger than the sizes customary in erection work for ¾-in. rope. Similarly, other elements of the design were worked out for long service rather than for saving in weight. The unit-stress basis in the structural steel parts was fixed at 16,000 lb., which is well below the governing stress for which regular erection equipment is designed.

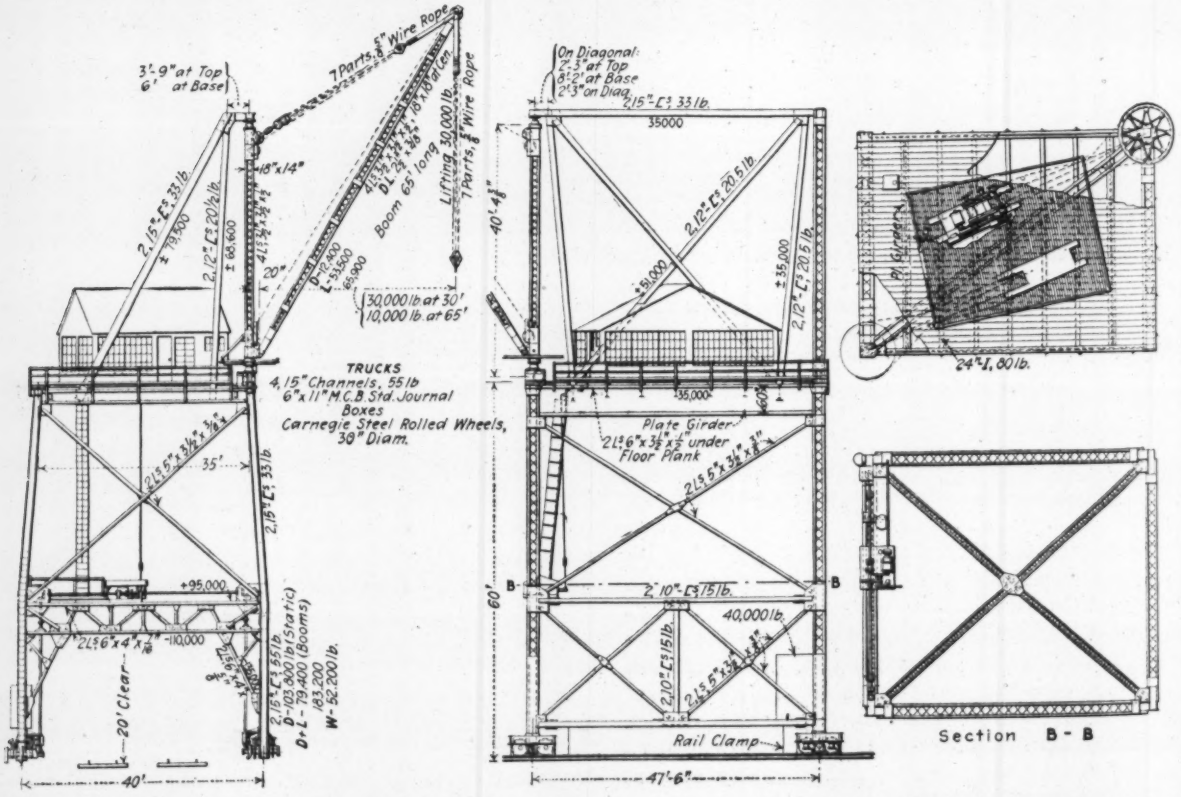


FIG. 3. STEEL DERRICK TRAVELERS FOR ERECTING SHIPS AT FEDERAL SHIPBUILDING YARD—OPERATED BY TWO FIFTY-HORSEPOWER HOIST MOTORS AND TWENTY-FIVE-HORSEPOWER PROPELLING MOTOR

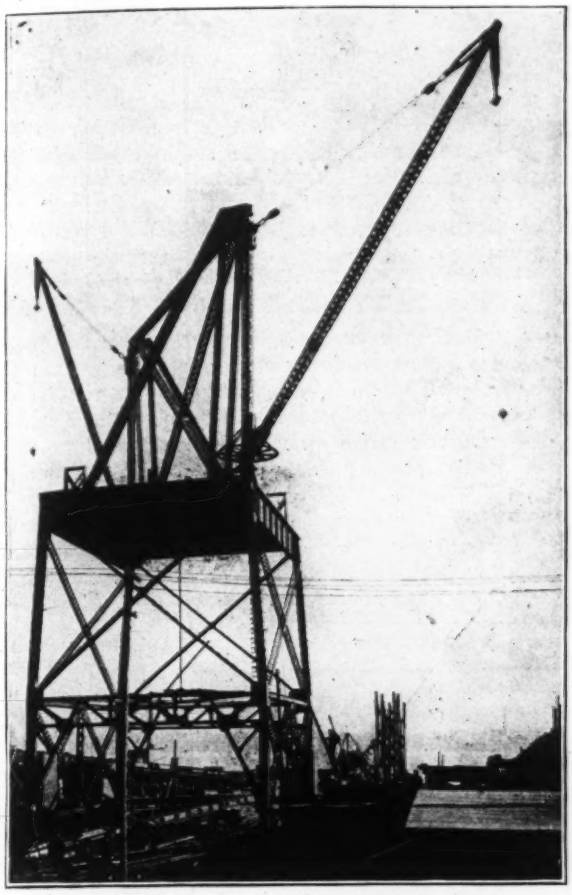


FIG. 4. DERRICK STIFFLEGS INDEPENDENT OF MAST

The two masts are braced by a diagonal truss in the plane connecting them, and by transverse stifflegs in the two short sides of the ground plan. The chief feature of the general derrick design is the use of the pillar-crane principle, the mast not being the compression member of the back-stay truss as it is in ordinary derricks. A separate compression member is introduced in the truss, just behind the mast, so that the upper mast bearing is relieved of vertical load and acts purely as a collar bearing, and the vertical load on the mast step is limited to the direct weight of the derrick and load instead of being twice this amount or more. Support of the upper mast bearing involved some structural complication. The bearing is attached directly to the upper member of the diagonal stiffleg truss and is braced laterally by a short connection strut from the top of the transverse stiffleg frame directly over the collar bearing.

Points of special mechanical design, to insure reliability in long service, are found in the mast bearings and the gantry trucks. The latter embody a pivoting support of the gantry post on the truck. Two 30-in. Carnegie rolled steel wheels carry a truck frame consisting of four 15-in. 55-lb. channels set longitudinally over the wheel journal boxes (6 x 11-in. M. C. B. standard boxes). Two thick gusset plates extending down from these channels, between the two wheels, carry a transverse center pin which is embraced by the foot of the post. In the two forward trucks—which are the driven trucks, four wheels of the gantry being driven—the pinion shaft of the travel gear passes through the center pin and is journaled in it by means of bronze liners. A bevel-gear shaft extending down from the lower gantry platform drives this pinion shaft; the main pinion at the outer end of the shaft meshes with overhung axle gears.

The mast bearings, shown in the sketch below, were designed for good lubrication, slow wear and easy replacement. The lateral thrust in both bearings is taken by steel against steel; for the vertical load, the lower bearing has a bronze step. Large oil channels in the outer bearing case, fed by an oil cup, provide for long-time lubrication. Both bearings are in ring form, surrounding the central passage for the engine leads. For the present the boom line as well as the load line is carried through the lower step, but the former can, if desired, be led upward from the engine and over the top of the mast down through the upper bearing.

Provision for removing and replacing the bearings is made by seating the upper and the lower castings in recesses of the pedestal and mast bottom, respectively. After the bolts which hold the castings in place are removed, jacking up the mast an inch or two will enable the bearing as a whole to be pried up and slipped out sideways.

Power is supplied by a protected live-rail alongside one of the gantry track-rails, through a sliding shoe. Direct current at 230 volts is obtained from the yard network. Two electric hoisting engines, placed on the upper deck as shown in the plan, serve the derricks; the hoists of four out of the ten cranes have built-in swinging spools, while the others have separate swingers. The travel machinery is seated on a bracket attached to the lower forward transverse strut of the gantry bracing. The motor pinion drives a cross-shaft connected by bevel gears at the tower legs to the downshafts already mentioned.

The crane weighs 369,000 lb., including steel and machinery. Two 20-ton counterweights are provided on the legs which carry no derrick, to prevent all uplift

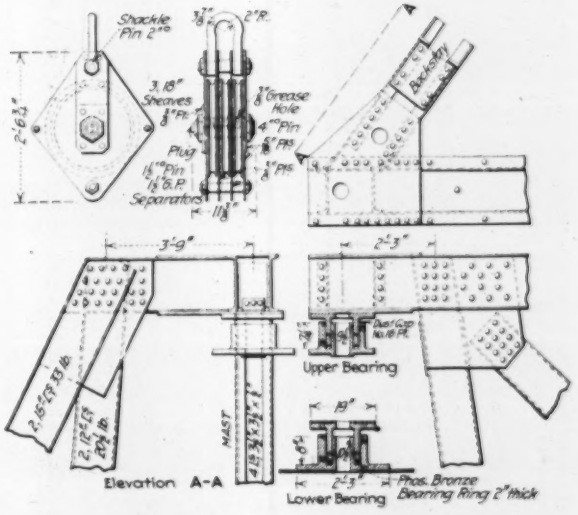


FIG. 5. MAST BEARINGS DETAILED FOR LONG WEAR AND EASY REPLACEMENT

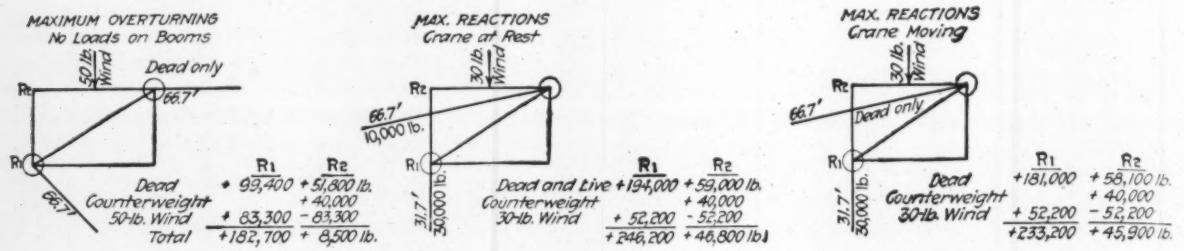


FIG. 6. CALCULATIONS SHOW TRAVELER STABLE UNDER FIFTY-POUND WIND PRESSURE WHEN CARRYING NO LOAD—TWO COMBINATIONS OF LOADS WITH THIRTY-POUND WIND GIVE MAXIMUM TRUCK REACTIONS

tendency at these legs under the worst combinations of boom position and wind, as indicated by the diagrams reproduced herewith.

Early delivery was a governing factor throughout. The cranes were designed in August, 1917; the final stress sheets were completed on Sept. 4; detailing was started two days later. Shipments in sufficient quantity to warrant erection were made by Nov. 30, about 2½ months after the stress sheets were completed; final shipment was made Feb. 22. Railway delays during the winter proved so serious a handicap that the last of the cranes was not completed until May.

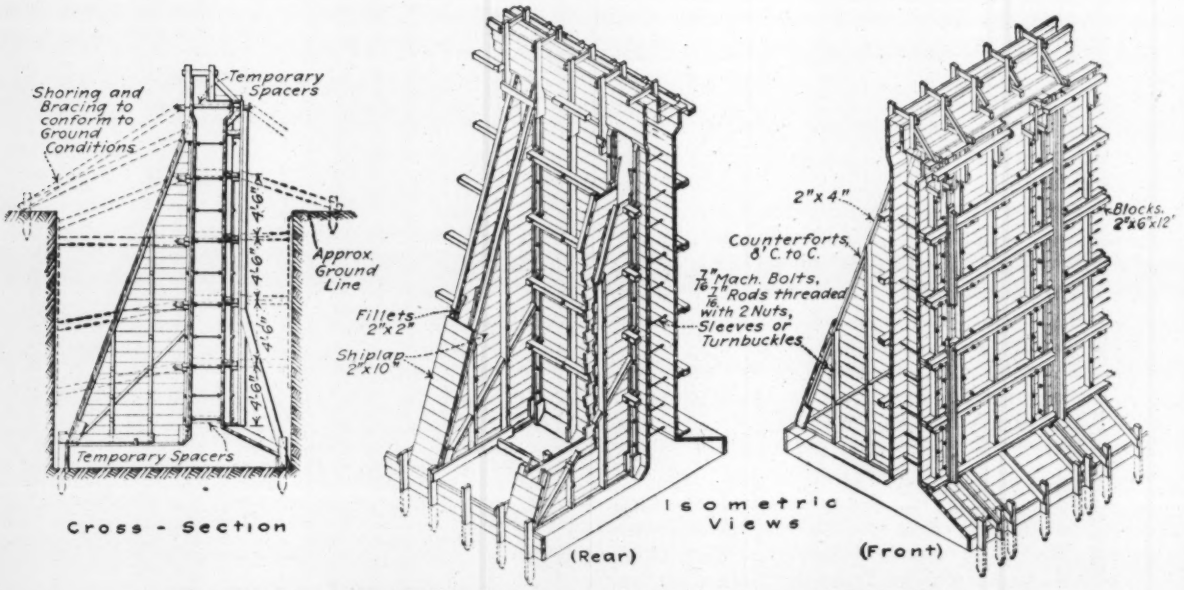
Robert McGregor, vice president and general manager of the Federal Shipbuilding Co., took personal charge of the selection of the erection method. After it was decided that gantry travelers with derricks would have to be built, the entire problem was entrusted to the American Bridge Co., whose engineering department, under C. W. Bryan, chief engineer (with O. E. Hovey, assistant chief engineer, directing the work personally) designed the cranes. The same company built the gantries and derricks and Post & McCord erected them. The Federal Shipbuilding Co. equipped the cranes for operation.

City Designs Forms for Portland Grade Separation

Concrete for Abutments and Retaining Walls Placed by Buggies—Dump Cars on Electric Line Make Fills

EXCAVATION for lowering 3½ miles of railway 12 ft. to a new grade, the building of seven steel and concrete street bridges, and the placing of gravel fills for bridge approaches having concrete retaining walls, are the main items of work in the separation of street and railway grades on the line of the Oregon-Washington Railroad & Navigation Co. at Portland, Ore. This work with its permanent structures, was described in *Engineering News-Record* of last week, on page 1097. Some of the features of the construction work are described below.

Buggies are used in placing the concrete in the bridge abutments and piers, and in the retaining walls of the inclined approaches to the bridges. At each site the mixer and the piles of material are placed on the original street surface. The mixer has an automatic charging device, into which the materials can be dumped directly from wheelbarrows without raising the latter. The concrete is discharged into buggies



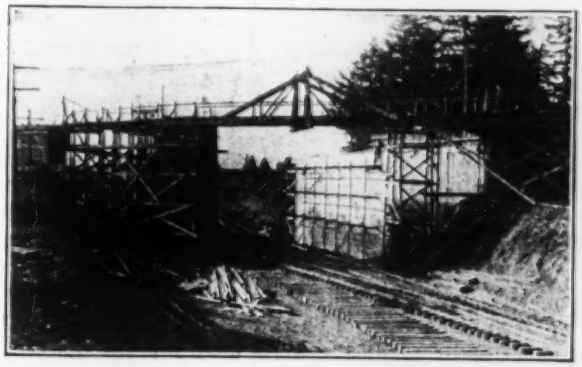
DESIGN OF THE ABUTMENT FORMS WAS INCLUDED IN THE ENGINEERING PLANS

which are raised by a two-platform elevator operated by a steam hoist.

Runways provide for pouring the concrete from the tops of the forms, the buggies dumping into metal or wood chutes at the runways. The metal chutes are of the telescopic type, with a hopper at the top. The wood spouts were built on the job and are about 6 x 8 in. inside. They are made in different lengths, the shorter ones being substituted for the others as the concrete rises in the forms.

At two of the bridges, the concrete for the abutment and retaining walls on the north side was made in a mixer located on that side of the tracks. The mixer was then moved to the south side for pouring the south abutment and retaining walls and the two piers, light trestle bridges being built for the concrete buggies. At the other bridges, all of the concrete was made on one side, the trestles for the buggies being extended over the entire length of the structure. This construction, with a light timber truss span over the tracks, is shown in the accompanying view.

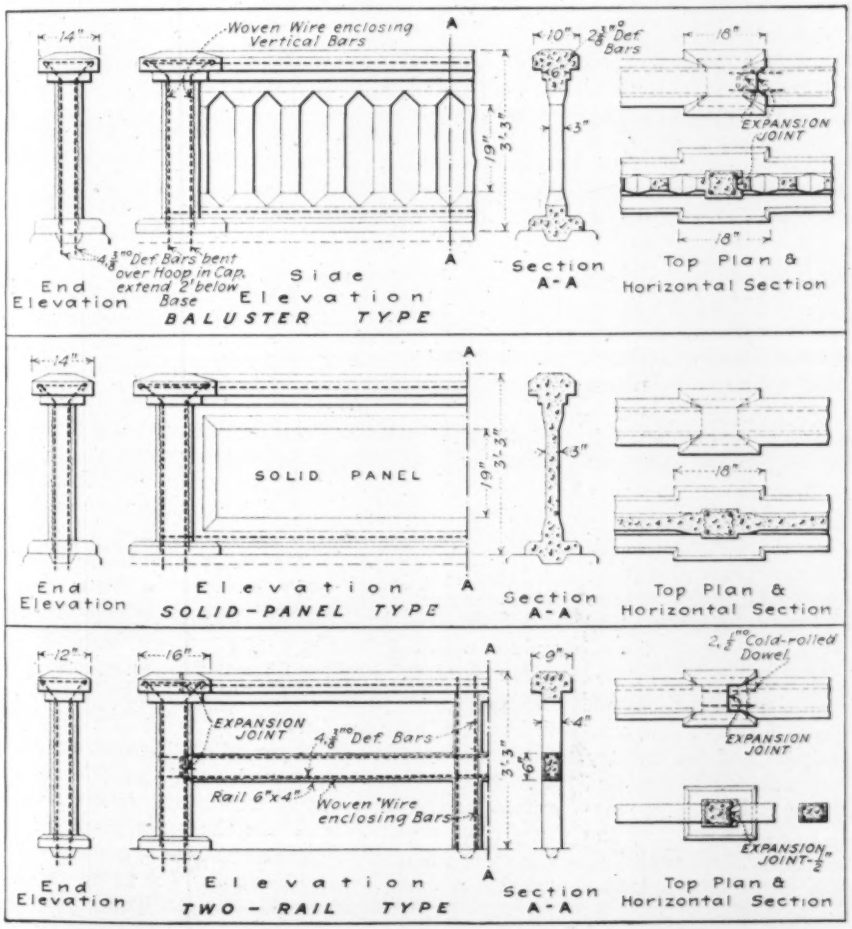
Carborundum blocks were used for rubbing down the exposed concrete surfaces, this being done directly after the forms were removed, and while the concrete was still somewhat green. The purpose of this was more the removal of the form marks than the production of any special facing. In the placing of the concrete extreme care was used to have it well spaded against the forms, and the taking of this precaution resulted in a good and uniform surface.



TEMPORARY BRIDGE CARRIES CONCRETING BUGGIES OVER TRACKS TO PIER AND ABUTMENT FORMS

Foundation piles were not required. As the soil is generally of a gravelly nature, with sufficient clay to prevent serious caving, the excavation for the substructures gave little trouble and required only a moderate amount of bracing.

Design of forms for the abutments as a part of the engineering plans is an unusual feature. The reason for this was that on other work trouble had been experienced from the desire of contractors to use forms that were considered too light. With form design covered by the plans and specifications there would be little inducement for the contractor to use light forms. In the actual construction of this work, however, the contractor was allowed to deviate from the plans, substituting designs of his own after they had been approved by the city's engineers. For the greater part of the work the forms were faced with 1-in. shiplapped planks, surfaced on one side, and wires were used for tying the forms together. The typical design mentioned and shown in one of the drawings called for 2 x 10 in. ship-lap lumber, with 2 x 6-in. studding surfaced on four sides, and with tie-rods instead of wires. The parapet walls on the I-beam bridges are of the baluster type, poured in place, in steel forms. The panels are monolithic, with mortise and tenon expansion joints at the panel-post connections. Solid panels are used for the parapets on



CONCRETE PARAPETS FOR BRIDGES AND RAILINGS FOR RETAINING WALLS

the wing walls. Concrete railings surmount the retaining walls of the inclined approaches. These have two rails supported by posts at the panel points and the middle of each panel. The parapets and railings are shown in one of the drawings.

Fills for the approaches are to be made with gravel dredged from the Willamette River and hauled over the street railway lines by electric locomotives with trains of side-dump cars. This is considered excellent filling material, having sufficient sand to make a dense mass, and as it has practically no settlement after being deposited the paving can be laid upon it immediately.

Temporary trestles will be used for the dumping, with their decks a little above the elevation of the finished grade of the street. After the trestle has been filled a track will be laid on the fill on either side and shifted laterally as the fill progresses so as to cover the full width of the street by dumping, without any rehandling of the material. For this work a light track will be used, having ties about 3 ft. apart.

The plans provide for a four-track railway, having a roadbed 100 ft. wide which forms the bottom of a cut, the slopes of which will be sodded. The cut is now made for two tracks only and has a bottom width of 34 ft., with side slopes of 1:1, except where the soil requires 1½:1. At the street bridges the excavation is made for the full 100-ft. width.

Excavation for the railway was made by steam shovels, the material being loaded into trains of 30-yd. air-operated dump cars. The original plan was to operate two shovels, one near each end of the job, and work was started in this way. Later it was decided to use only one machine, the other being kept in reserve. Most of the work was done with a steam shovel having a 5-yd. dipper and serving two trains of 15 cars each, with a haul of about five miles. The material was used for filling a trestle on the main line between Portland and Seattle, crossing a flat subject to overflow from the Willamette River.

Excavation was made in three cuts, the first being about 6 ft. deep and along one side of the finished cut. The material from this was loaded into cars on the original main line. Track was then laid at the bottom of this cut, and the opposite side of the excavation was taken down to final grade. Track was then laid at this side and the shovel made the third cut to widen the excavation to the required dimensions.

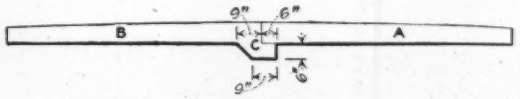
The work for the city is under the direction of O. Laurgaard, city engineer, and is in direct charge of R. E. Kremers, chief of the bureau of highways and bridges. The railway work is under S. Murray, chief engineer of the Oregon-Washington Railroad & Navigation Co., with A. C. O'Neal in direct charge. The Pearson Construction Co., Seattle, has the contract for all the work for the city. This includes the bridges and approaches, the public utility changes and the railway excavation at the bridge sites. The Pacific Bridge Co., Portland, has the subcontract for filling. The contract for excavation between the bridges was let by the railway company to Twohy Brothers, of Portland. The total cost will be about $900,000, of which the lowering of the railway represents about $300,000. It is expected that the work will be completed this year.

Design Permits Use of Concrete Roads During Construction

Added Cost of $1000 Per Mile Thought Justifiable Since Public Is Not Denied Value of Continuous Travel

By W. E. Conklin
New York State Highway Commission, Albany

RAPID increase in density of traffic on highways makes it more and more important to provide for keeping highways open to the traveling public during construction or resurfacing operations. On roads of heavy traffic it frequently happens that the right-of-way is too narrow for a side road and that no alternate route is available. The result is that the necessity for keeping the road open for traffic may be a matter of considerable importance in selecting the type of pavement to be adopted.



FIRST SLAB IS UNDERCUT FOR LAP-JOINT

It has been demonstrated that waterbound and bituminous macadam pavements can be constructed satisfactorily, although at increased expense, without closing the highways to traffic. But, excepting where the highways are unusually wide, the construction of pavements or of pavement foundations of cement concrete has presented a more difficult problem. The added difficulty is largely due to the necessity for allowing time for the concrete to cure thoroughly, for which some specifications require a month.

It is practicable to construct concrete pavements, using slabs half the width of the finished pavement, and yet keep the highway continuously open to traffic. This method makes it possible to carry on the construction with the full width open, except for a stretch not to exceed a mile in length, in which only half is open while the other half is curing.

One of the disadvantages of this procedure might be the unequal settlement of the slabs, resulting in unevenness and consequent excessive wear at the longitudinal joint. The accompanying sketch indicates one method of providing against this unequal settlement. Slab A is constructed first. After it is satisfactorily cured and opened to traffic, work is started on the other side and Slab B is constructed. The edge of Slab A is undermined to allow the concrete to be tamped under as shown at C. For the dimensions shown this would add ½ cu.ft. per linear foot to the quantity of concrete, or 98 cu.yd. per mile. At present prices the additional cost would be about $1000 per mile. There is, of course, a further element of increased cost in this method caused by the necessity of moving the concrete mixer back from time to time. On the other hand, the advantages gained are a permanent type of pavement constructed without closing the road. The public can well afford to pay for pavements that can be used for 365 days a year.

Remodeling Baden Boiler Plant, St. Louis Water-Works

Even at Present Prices Resulting Operating Economy of 6.6 Per Cent. on First Cost Is Expected

By K. Toensfeldt

Principal Assistant Mechanical Engineer, St. Louis Water Department

Obsolescence and deterioration of the manually operated boiler plant of the Baden station of the St. Louis water-works, after twenty years' use, led to the rebuilding which is now in progress. An estimated operating economy amounting to 6.6% on the cost of the changes, over and above an allowance of 6% for capital charges, justified the work of reconstruction, even in this time of high prices. Moreover, the work fits into a general program of pumping station improvement, and has been facilitated by the release of old but efficient boilers from another pumping station. The rebuilt plant will have a capacity of 3280 boiler horsepower.

The old boiler plant at the Baden station was completed in 1898. It consists of eight manually operated 227-hp. Heine type water-tube boilers, with Hawley down-draft furnaces, in four batteries of two each. The furnace tube spacing is such that only coals of the larger sizes can be used. The accompanying estimate of the saving that could be effected by so remodeling the boiler plant as to make possible the use of screenings for fuel and the substitution of automatically operated for hand-operated furnaces is based on actual coal and operating costs for the year 1916-17.

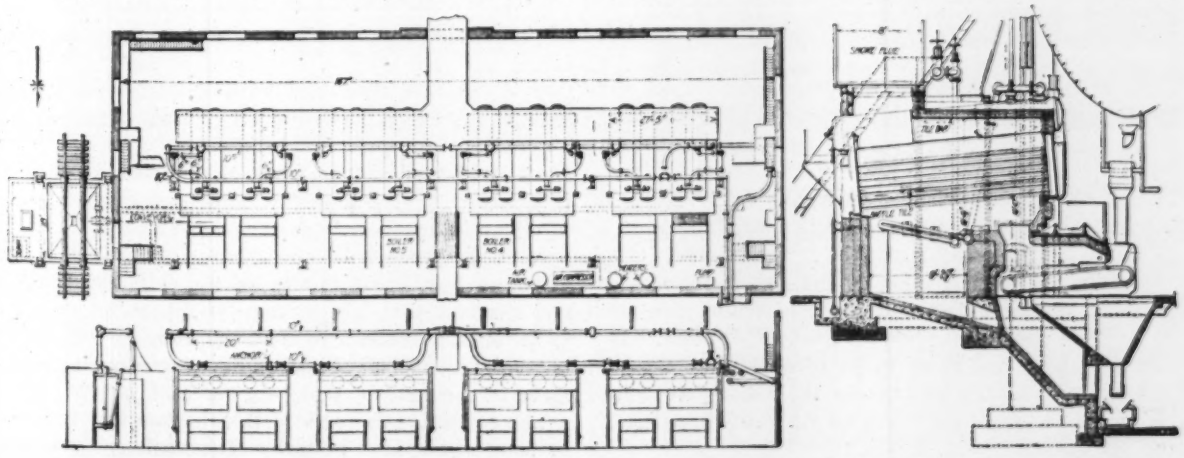
Some of the symptoms of age in the boilers may interest readers. Each boiler has two 36-in. drums, made from plates which were originally $\frac{5}{16}$-in. thick, with longitudinal, triple-riveted, lap joints. The old tubes require continual renewal, as hydrostatic tests to 150 lb. after turbining, invariably reveal leaks, with consequent necessity of removal of from two to eight tubes. These tubes, when cut to pieces, have commonly shown weak spots. During the past year a tube rupture which occurred in the sixth bank caused a temporary shutdown of the entire station. Save for the immediate reconstruction, all of the boilers would have to be retubed.

The remodeled boiler plant will furnish steam at 150 lb. pressure and 150° superheat. The determination of the type and size of the new boilers was governed by the present Heine type water-tube boilers, which were taken out of use at high-service station No. 1, due to the connection of the engine house of this station with the boiler room of high-service station No. 2. These boilers, four in number, are in good condition, each of 410 boiler horsepower capacity, and will be dismantled and reinstalled, together with their superheaters, at the Baden Station. To maintain uniformity of parts, four new boilers of the same type and size will be added.

The boilers will be fired by chain-grate stokers with a ratio of boiler heating surface to grate area of 48. This ratio, with a properly designed furnace, will drive the boiler efficiently at below rating and at 30% and more over capacity when burning Illinois screenings of from 10,000 to 11,000 B.t.u. per pound. The daily peak for the maximum pumping periods at this plant, which pumps into a closed system, varies about from 1.1 to 1.3 of the average and from 1.2 to 2 of the minimum. The chain-grate stoker meets these load demands nicely, and it was considered unwise to install a more costly and elaborate type of stoker with all attendant auxiliaries, especially in a water-works boiler plant where the reserve capacity in the equipment is larger than in most commercial plants.

The question of installing an economizer was also considered, and although a fair return on the investment might be realized, over the life of the economizer, yet with the present load and cost of economizers, and for a few years to come, it was questionable whether any gain would be realized. Provision has been made for the installation of economizers in the future.

The coal is dumped from the railway track into the track hopper, passes through a crusher and reciprocating feeder into a continuous pivoted bucket conveyor, which elevates it and dumps it, with the aid of a traveling tripper, into the desired bunker. The same conveyor receives the ashes from the boilers and delivers them to the ash hopper over the track hopper. Ashes may be deflected through a chute to a car on the side track or may be stored in the hopper. A conveyor of the same type, handling both coal and ashes, has been in service at low-service station No. 2 for three years



BOILER PLANT HAS COMBINED COAL AND ASH CONVEYOR SYSTEM AND STEAM PIPING IS ON LOOP PLAN

ESTIMATED SAVING FROM REMODELING BOILER PLANT

Operating figures, 1916-17:	
Total coal burned, tons	22,750
Cost egg coal unloaded at $1.65 per ton	$37,537
16 firemen at $90 per month	17,280
16 coal passers at $65 per month	12,480
1 boiler-room foreman at $75 per month	900
1 boiler washer at $90 per month	1,080
Total	$69,277
Total water evaporated, pounds	288,000,000
Cost per 1000 lb. of steam	$0.240
Reconstruction cost estimates:	
New tunnel	$10,000
Bunker, coal and ash-handling equipment	60,000
Four 400-hp. boilers	35,200
Four superheaters	7,500
Moving four 400-hp. boilers from Bissell's Point to Baden	3,200
Brick settings for eight boilers	9,600
Stokers for eight boilers	16,000
Changes in steam headers and feed lines	3,000
New breeching	5,000
New stack	28,000
Total investment	$177,500
Saving by reconstruction:	
To evaporate 288,000,000 lb. of water with screenings containing 10,000 B.t.u.'s per pound would require: (288,000,000 x 970 x 1.07) (10,000 x 65) = 46,000 lb., where 1.07 = factor of evaporation and 0.65 = efficiency.	
Hence with the new equipment we would have:	
Total coal burned, tons	23,000
Price per ton	$1.35
Cost of screenings	$31,050
6 firemen at $90 per month	6,480
8 coal passers at $65 per month	6,240
1 boiler room foreman at $75 per month	900
2 boiler washers at $90 per month	2,160
Interest on investment at 6 per cent	10,650
Total cost to generate steam	$57,480
Cost per 1000 lb. of steam	$0.199
Yearly saving possible	$11,797
Rate of saving on investment, per cent	6.6

and no appreciable wear due to handling ashes in the same conveyor has been noticed. The storage capacity of the bunkers was made as large as possible, this feature having manifested itself as very desirable during the past winter.

The coal may feed from the bunker through automatic weighing scales into the stoker hopper, or it may be shunted by means of a long spout (with scales pushed aside) from the bunker past the stoker hopper into the siftings hopper and down into the conveyor, whence it may be elevated and dumped into another hopper.

All the coal is weighed as used and the boiler feed water is measured by a venturi meter with integrating and indicating recorders. To show the relative station performances, a weekly efficiency record is bulletined at all stations. Each boiler is equipped with indicating steam flow-meter and CO_2 apparatus. Stack breeching temperatures are recorded on a continuous chart.

The steam piping was designed on the loop plan, so that both in the engine and boiler rooms there will be two ways of getting steam to the engines or from the boilers. The maximum velocity in the 10-in. header alone will approximate 7600 ft. per minute; in both the header and loop, 3800 ft. All valves and fittings will be of extra heavy cast-steel with all joints male and female faced.

A new reinforced-brick veneer smoke stack, 235 ft. in height and of 9½-ft. mean diameter, will maintain a 1-in. draft at the breeching of the farthest boiler.

During the reconstruction of the station the service must be uninterrupted, and for this reason the new boilers face opposite the present ones. This permits the new breeching and stack to be erected while the old boilers are in service, and throws the major part of the reconstruction work out of the way of the firing aisle of the old boilers.

In the pump room a single 10-in. steam header will replace the existing three 10-in. steam mains which feed the six vertical triple-expansion Allis-Chalmers pumping engines. A renewal of the header is necessitated by the proposed use of superheated steam, which will require heavier valves and fittings. Diminished radiation surface and superheated steam combined are expected to increase the pumping efficiency.

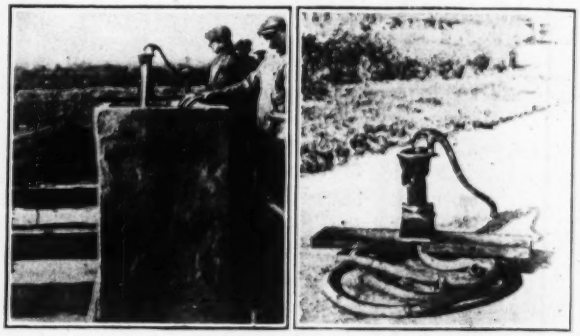
It is expected that the remodelled plant will be well toward completion by the summer of 1919.

Sludge Depth Measured by Pump and Hose

By Frank Woodbury Jones
Supervising Chemist, Sewage Works, Fitchburg, Mass.

THE somewhat difficult problem of obtaining, with any degree of accuracy, the depth of sludge in deep sewage sedimentation tanks has been solved satisfactorily at Fitchburg, Mass., by means of a pitcher pump and rubber hose.

Five Imhoff tanks and four secondary or post-filter tanks, 25 and 22.5 ft. deep, respectively, were put in



HOSE ATTACHED TO PUMP IS LOWERED THROUGH IMHOFF TANK CHIMNEY TO MEASURE SLUDGE DEPTH

operation in October, 1914. Since then the depth of sludge has been determined from time to time by a small pitcher pump screwed to a plank 3 ft. long, and a 1-in. rubber hose 28 ft. long passed through a hole in the plank and attached to the pump with a union coupling. The hose is divided into foot lengths by hose clamps carrying numbered brass tags. Into the free end of the hose is inserted a piece of lead pipe of sufficient weight to keep the hose plumb when dropped into water.

In operating this measuring apparatus, the plank carrying the pump and hose is placed across the top of one of the chimneys or gas vents and the hose is pushed into the tank through a hole punched in the scum. The pump is then started. Next the hose is lowered rapidly until near the supposed sludge level, when it is dropped 3 in. at a time, sufficient pumping being done between shifts to insure a complete change of water in the hose. As soon as the sludge level is reached the pump will raise sludge. At this point the length of hose below the top of the chimney is noted, and since the total depth from the top of the chimney to the bottom of the tank is known, the depth of sludge is readily calculated. Three different measurements are made in each Imhoff tank, one for each hopper.

The apparatus is operated best by two men and can be used on any kind of tank. The whole outfit weighs about 45 lb., is easily manipulated, and gives the depth accurately within two inches.

Approximate Live-Load Stresses in Railway Bridges

Linear Formula for Floorbeam Concentration Gives Shears and Moments Easily; Example Shows Negligible Error

By H. R. White
Engineer, U. S. Steel Products Co., London, England

A SIMPLE formula has been derived from which it is possible to calculate approximately almost all of the direct stresses in an ordinary bridge due to live-load. The formula here given is for Cooper's E10, but a similar one could easily be found for any set of wheel loads. It was derived from the column loads in a long curved viaduct comprising a great many combinations of span lengths, in which there were about a hundred results, all of which were plotted. The formula in question is,

$$R = 0.55\ (l_1 + l_2) + 10 \qquad (1)$$

where R is the column load in thousands of pounds, and l_1, l_2 are the adjacent spans in feet.

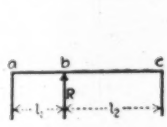


FIG 1

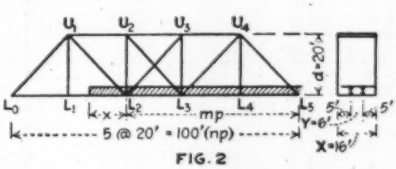


FIG. 2

Suppose it were required to find the maximum bending moment in a beam, Fig. 1, of length $l_1 + l_2$, at a point distant l_1 from the left support, due to a loading of E25. This bending moment would be equivalent to that produced by a concentrated load at the point in question, and as the criterion for the wheel position is the same for bending moment as for column reaction the equivalent concentrated load is obviously equal to the load on a column if one were introduced at that point and the two spans cut apart. Therefore,

$$R = 2.5\ [0.55\ (l_1 + l_2) + 10]$$

$$M = \frac{Rl_1l_2}{l_1 + l_2} \qquad (2)$$

It is to be noted that R and $l_1 + l_2$ are constant for any one beam, so that the live-load moments in the beam are proportional to the products l_1l_2.

Calculations for a truss span can be developed from this relation, using: p = panel length, feet; n, number of panels; pn, span; m, number of panels fully loaded to produce maximum stress; d, depth of girder, feet; X, spacing of trusses; Y, spacing of stringers; R, equivalent concentrated load in each case, and M, bending moment produced by R.

In calculating a stringer the length of the stringer equals the panel length and the moment is calculated at the center, hence $l_1 = l_2 = \frac{1}{2}p$. Then the equivalent concentrated load at the center is

$$R = (0.55p + 10)2\tfrac{1}{2} \text{ and } M = \tfrac{1}{4}Rp$$

The floorbeam or cross-girder reaction is based on the moment in a girder of two panel lengths ($2p$). In this case

$$R = (0.55 \times 2p + 10)2\tfrac{1}{2}$$

and M is determined in the usual way for concentrated loads; thus, in a single-track span $M = \frac{1}{2}R(X - Y)$.

The moments in a truss span are found from eq. (2) by taking each point in succession and calling l_1 and l_2 the distances from that point to each bearing; for example, considering point L_2 in Fig 2, l_1 would equal $2p$ or 40 ft., l_2 would equal $3p$ or 60 ft., and, $l_1 + l_2$ being equal to the span for each point, R is constant for all moment figures. In the case of parallel chords the stresses are found as usual by dividing the moments by the depth.

In calculating shearing stresses the length on which R is based is the critical length. In the case of a single-system truss with parallel chords, of total length n panels, the load must advance a distance x into the panel under consideration. If there are m panels loaded, $x = mp/(n - 1)$, and R must be found for $l_1 = x$ and $l_2 = mp$; then

$$M = \frac{Rl_1l_2}{l_1 + l_2} = \frac{Rxmp}{x + mp} \qquad (3)$$

and the shear in the panel is $S = M/p$.

Considering member U_1L_2 in Fig. 2, there are three panels fully loaded; i.e., $m = 3$; therefore $mp = l_2 = 60$ ft., and l_1 or x is 15 ft. The concentration R is found for $l_1 = 15$ and $l_2 = 60$ to be 128.1 (thousands of pounds for E25). Then, from eq. (3), $M = 128.1 \times 15 \times 60 \div 75 = 1537$ thousands of footpounds, and the shear in the panel is $M/p = 1537 \div 20 = 76.8$. From this, the stress in the member is $76.8\sqrt{2} = 108.5$. Exact calculation gives this figure as 112, or a difference of only 3 per cent.

This process must be followed for each panel. It will be noticed that the method does not give the shear in the stringer or the total reaction of the truss, which are therefore taken either from tables or from the approximate formula $S = 0.64L + 12$, which holds for E10 loading on span lengths L ranging from 20 to 100 ft.

To simplify the explanation of this method an example has been worked out and the results compared with figures made from actual wheel loads. The example taken is a 100-ft. single-track truss span to carry E50 (i.e. E25 on each stringer and truss) with five 20-ft. panels. The trusses are 20 ft. deep and 16 ft. apart, and the stringers are 6 ft. apart (see Fig. 2). The figures are tabulated herewith, shears and stresses being in thousands of pounds and moments in thousands of foot-pounds.

STRESS CALCULATION FOR 100-FT. SINGLE-TRACK TRUSS SPAN UNDER E50 LOADING

						Result from Formula	Result from Wheel Loads	Error
Stringers	$L = l_1 + l_2 = 20$ ft.							
Shear	$= 2.5(0.64L + 12)$					62	62.5	1%
Moment	$R = 2.5(0.55p + 10) = 52.5$							
	$M = \frac{52.5 \times 20}{4}$					262.5	258	2%
Cross-Girders	$R = 2.5(0.55 \times 2p + 10) = 80$							
Shear						80	82	2½%
Moment	$= 80 \times 5$					400	410	2½%
Trusses								
Member	l_1	l_2	R	$M = \frac{Rl_1l_2}{l_1 + l_2}$				
L_0L_2	20	80	162.5	2,600		130	136.5	5%
L_2L_4 / U_1U_4	40	60	162.5	3,900		195	197.2	1%
					$S = \frac{M}{P}$			
L_2U_1	20	80	162.5	2,600	130	184	193	5%
U_1L_2	15	60	128.1	1,537	76.8	108.5	112	3%
U_2L_2 / U_2L_4	10	40	93.7	750	37.5	53.2 / 37.5	54.8 / 38.8	3½%
U_1L_1 Stress equal to cross-girder reaction						80	82	2½%
End Reaction (with end cross-girder) = $2.5(0.64L + 12)$						190	187.5	1½%

The above figures are all that need be put down, as

any intermediate figures can easily be done on the slide-rule. It will be seen that the error is never more than 5 per cent., which is quite near enough for preliminary figures, estimates or even checking, though not near enough for final figures of work under construction. However, by this approximate method the figures can be completed in a fraction of the time required for accurate calculation. Once the general principles are understood it is only necessary to remember eq. (1), which can easily be memorized.

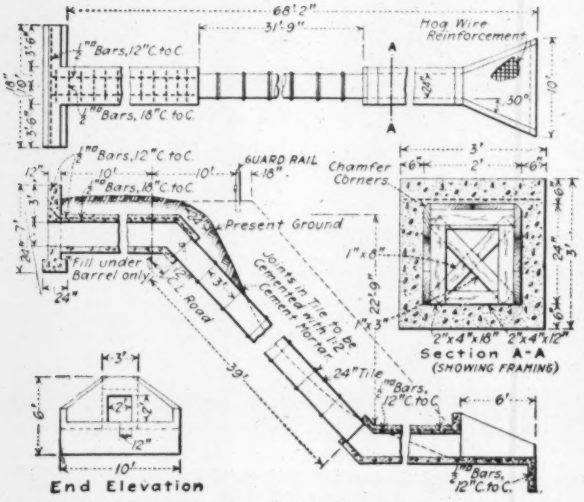
Special Culvert for Roads Built in Rolling Country

Combination of Reinforced Concrete and Vitrified Clay Pipe Proves Cheaper Than Usual Drop Inlet

By F. M. Balsley
Division Engineer, Wisconsin Highway Commission, Madison.

Drop-inlet culverts to convey water from the upper ditch to a point of discharge very much lower on the other side of the road are often necessary on highway work in rolling country. The design shown in the accompanying illustration was worked up to meet a condition where the point of discharge was 24 ft. lower than the flow line of the upper ditch.

If a conventional drop-inlet culvert had been installed at this point it would have necessitated the excavation of a well at least 22 ft. deep and the driving of a tunnel



MUCH EXPENSIVE AND DIFFICULT EXCAVATION SAVED BY USE OF THIS DESIGN FOR CULVERT

from the bottom of this well to the point of discharge. Another alternative would, of course, have been to cut through the entire bank. In either case the excavation would have been difficult and expensive. The special design is considerably cheaper and in other ways much to be preferred.

Reference to the drawing will show that the ditch was cut to a slope of about 1½ to 1, and of a width to take the 24-in. sewer pipe which was used in place of concrete because no economical method could be devised by which the concrete could be poured on so steep a slope. Tile of this size could not be found in stock in the neighborhood, and the necessity for ordering it specially added somewhat to the cost of the work, which was $227.61, distributed as follows:

Reinforced concrete, 10 cu.yd. at $11	$110.00
24-in. sewer pipe, 39 lin.ft.	52.71
Freight on pipe	31.40
Labor installing pipe	15.31
Contractor's fee, at 15%	15.34

A total of 146 lb. of steel was required for the reinforcement exclusive of the "hog-wire" used in the apron. A complete bill of material follows:

Steel,

2	½	in. sq.	bars	16	ft. long
22	½	"	"	2½	ft. "
6	½	"	"	9½	ft. "
3	½	"	"	14	ft. "

Cement, 15.5 bbl.
Sand, 4.3 cu.yd.
Stone, 8.6 cu.yd.

The design can easily be modified in dimension or in slope of barrel to fit almost any condition found in the field. In many cases it will be found that considerable saving will result.

Minnesota Cities and Railway Earnings Tax

Railroads in Minnesota pay a gross earnings tax to the state, and on account of this are exempted from assessments for local improvement work. That this is a gross injustice to municipalities was asserted by the committee on municipal affairs at a recent meeting of the Minnesota Surveyors and Engineers' Society.

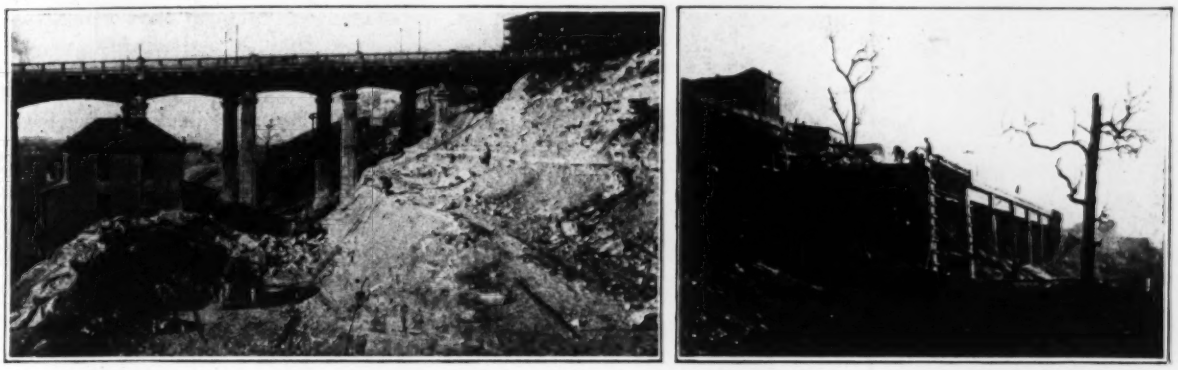
The general effect is to delay local improvements in proximity to railroad property, it is said, and to some extent this is reflected for some distance each way in the vicinity of the railroad, resulting in depreciation of property values. When the improvements are made, if ever, they must be paid for by the city at large. It was pointed out that the state through its legislative body was aware of this injustice, but because the large cities were the ones which must suffer most no legislative action could be put through to remedy the injustice unless a campaign of education was carried on and the legislators from the country districts were asked by their constituents to right this wrong. It was recommended that the state set aside a portion of the tax each year from which to reimburse the municipalities for local improvements, such as paving, sidewalks and sewers, the assessments for which would fall on railroad property if it were not for the gross earnings law.

According to O. H. O'Neill, corporation counsel of the City of St. Paul, Minnesota is the only state where the legislature and the courts are committed to the doctrine that a gross earnings tax is in lieu of special assessments as well as general taxation, and it has been stated by an authority on taxation that a tax on gross earnings in lieu of all other taxes on railroads prevails in only three other states, Maine, Maryland and California. In many states a gross earnings tax is imposed upon the gross earnings of railroads in lieu of all state taxes, but to counties, towns and municipalities is left the right to impose taxes for local purposes. Wisconsin and Michigan had the gross earnings tax system but abandoned it in 1903 and 1900, respectively.

Road Along Rock and Shale Bluff Requires Walls and Viaduct

Approaches to Lower Deck of Twelfth St., Kansas City, Trafficway Viaduct—Location for Least Cost—Part of Wall on Pier Footings

DIFFICULT side-hill road construction is being carried out by Kansas City to provide means of access to the lower deck of the Twefth St. viaduct. The road is located on the ragged face of a bluff composed of alternating shale and limestone strata. Both retained-fill and concrete viaduct construction had to be used. Special study was given to the detail location of the road, in order to minimize cost; and by this means the work could be carried out within the bond-issue limit in spite of increase of prices. On acccount of the nature of the rock care had to be taken to place the footings where they will be permanently secure against disturbance.



HEAVY CUT DUE TO PROPERTY LIMITATIONS—VIADUCT USED IN PLACE OF HIGH RETAINED FILL

The Twelfth St. Trafficway viaduct, completed in 1915, was built to afford street connection between the wholesale and manufacturing district in the Kansas River bottoms and the main portion of the city, separated by a steep bluff 200 ft. high. The structure furnished the only traffic connection between Sixth St. to the north and Twenty-fourth St. to the south, a distance of more than a mile and a half. The new side-hill road, called Beardsley St., is an essential supplement to the viaduct, whose original design provided for the approach roads. The main deck being too steep for heavily loaded vehicles, a lower deck was provided, having a maximum grade of 3.47%. Beardsley St. will serve as outlet from this deck.

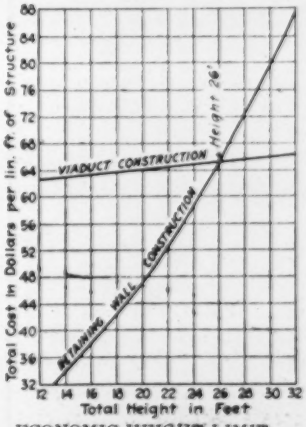
Bonds for building the road were voted in 1915, to the amount of $200,000. Prior to this, extensive surveys and borings had been made and complete plans prepared, from which the cost of construction was estimated at $211,600. When, after delay due to political conditions, the final design was made in 1917, the prices of materials and labor had increased at least 25%. It became necessary, in order to complete the improvement within the bond limit, to relocate the roadway and make a new and more economical design.

The hillside consists of alternating strata of limestone and shale lying in horizontal beds without faulting (see section shown in illustration). The limestone is generally thin bedded and is full of shale and clay seams. The lower part of the slope is covered with earth, disintegrated shale and limestone boulders, subject to slip in wet weather.

Stadia surveys of the hillside, to locate all outcrops, and test pits dug at various points, to uncover the edges of the limestone strata, gave fairly definite information as to the thickness and elevation of the rock ledges. Several errors in the conclusions drawn from the earlier core borings were corrected by these studies. The topography and the foundation conditions so ascertained, determined, in connection with certain property limitations, the alignment location of the road.

Beardsley St. was to extend about 1400 ft. north (to Bluff St. at Ninth St.) and about 2400 ft. south (connecting at 17th St. with Kersey Coates Drive, a park road near the top of the bluff). Its width was fixed at 26 ft., being made less than that of the lower deck of the viaduct (30 ft. between curbs), as the latter will carry the traffic from both branches of the road. Right-of-way had previously been acquired along about half the length of the road; the limitation which this fact imposed necessitated some rather expensive construction, as in the case of the heavy excavation shown in one of the views.

The north branch of the road was limited throughout by the right-of-way, and to avoid needless excavation its location was laid close to the down-hill property line. In general profile it descends to the north, but a short 1% reverse gradient 400 ft. long, starting from the Twelfth St. end, was necessary to fit the ground surface as closely as possible. Beyond this rise the road descends on grades of ¾% for 300 ft. and 2½% for 700 ft. The south branch, which ascends about 70 ft. to its connection with the Drive, was restricted in location by right-of-way only in the first 450 ft., where occurs the heavy cut shown by

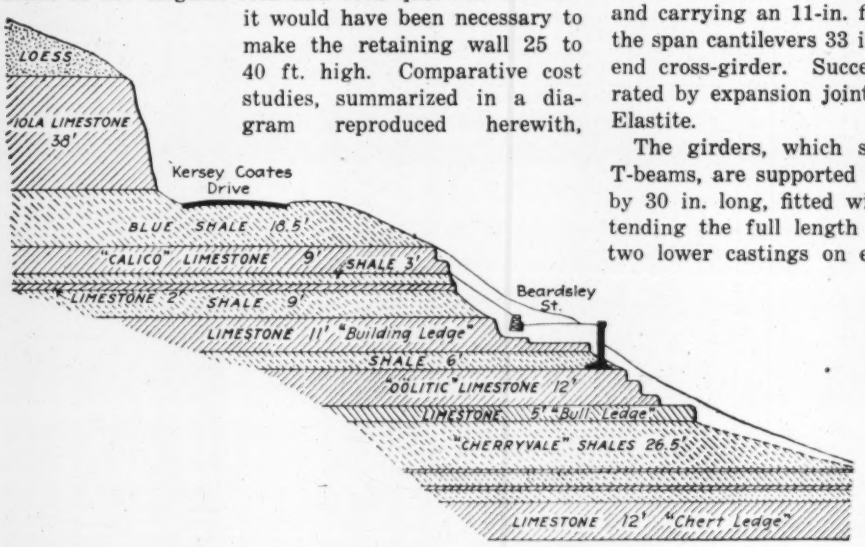


ECONOMIC HEIGHT-LIMIT OF RETAINING WALL

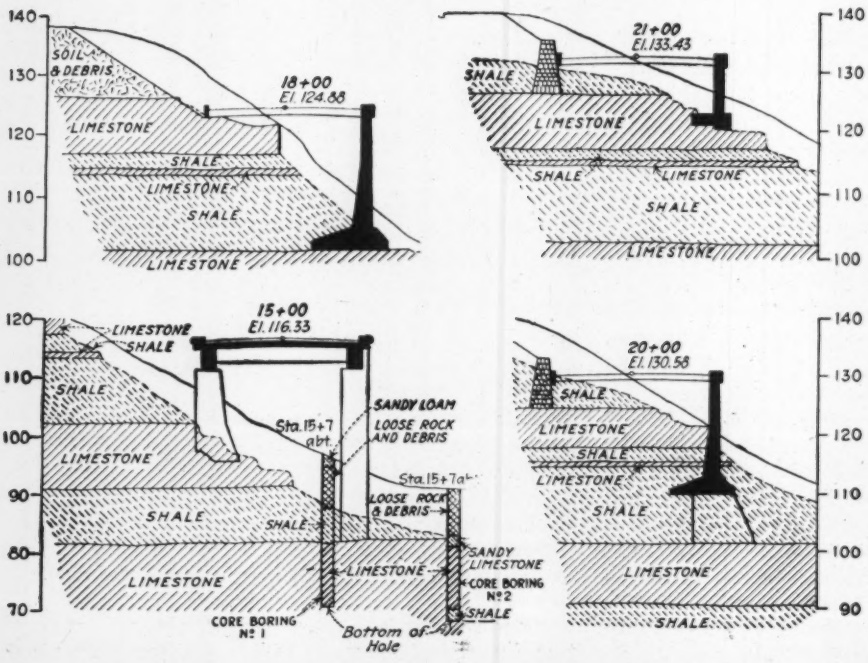
photograph. Beyond this its alignment could be adapted to the grades and ground surface. A uniform grade of 2.85% was used, and an alignment comprising four tangents was chosen. The maximum change in direction at any one point is 5 degrees, 21 minutes.

For the most part, the road is on fill retained by a reinforced-concrete wall on the down-hill side. The foundation of the wall was carried to the limestone ledge in all cases. As the edges of the strata are liable to break off, it was considered unsafe to place any of the footings near the extreme edge of a ledge; this consideration helped to fix the location.

Near the middle of the length of the south branch, so much of the original rock had been quarried out that it would have been necessary to make the retaining wall 25 to 40 ft. high. Comparative cost studies, summarized in a diagram reproduced herewith, showed that for heights from foundation to grade of more than 26 ft., viaduct construction would be more economical. The result was that viaduct was used on a length of 640 ft. Aside from questions of cost, the viaduct has a distinct advantage in the elimination of settlement troubles caused by deep fills. The most favorable location for the viaduct, laterally, was considered to be that in which the up-hill longitudinal girder just cleared the high points of the ground surface.



Typical Section of Bluff



Different Structures South of Twelfth St.

ALTERNATING STRATA OF SHALE AND LIMESTONE REQUIRED DIFFERENT TYPES OF WALL AND VIADUCT CONSTRUCTION

As finally designed, the structure consists of spans 39 ft. long c. to c. of piers. The two main girders, 30 in. wide by 42 in. deep below the floor slab, are spaced 24½ ft. apart c. to c. They support transverse girders 18 in. wide by 36 in. deep below the slab, spaced 11½ ft., and carrying an 11-in. floor slab which at each end of the span cantilevers 33 in. beyond the center line of the end cross-girder. Successive spans are entirely separated by expansion joints ½ in. thick filled with Carey Elastite.

The girders, which structurally are noncontinuous T-beams, are supported on cast-steel shoes 10 in. wide by 30 in. long, fitted with pins 2 in. in diameter extending the full length of the castings. One of the two lower castings on each pier can slide on a steel plate. The two shoes were placed in a pocket 6 in. deep and the space around the castings was filled with asphalt, after which the girders were poured, covering up the pocket.

The piers of each pair are entirely independent of each other. The up-hill pier was designed to withstand earth pressure against the girders and the pier, and therefore was battered on its down-hill face 1½ in. to the foot for the upper 8 ft., and 4 in. to the foot below this; the up-hill face is vertical. The down-hill pier has vertical faces, except for a batter of ¼ in. to the foot on the down-hill face to match the face of the retaining wall. At the top the piers are 4 ft. wide by 3 ft. 4 in. long (in the direction of the roadway).

The retaining walls are of the cantilever type. They foot directly on the rock, as is shown by the small-scale section, except for a length of about 120 ft. of the north branch of the road. Here the depth to hard rock was 40 ft.; a fairly good shale appeared at a depth of 28 ft. The wall was founded on this shale, but in order to pre-

vent sliding, piers 4 ft. wide and 20 ft. apart on centers were carried down below the base of the wall to the Chert Ledge limestone, a depth of 12 ft. These piers have a batter of 6 in. to the foot on their front faces.

The road was designed and its construction supervised by Victor H. Cochrane, engineer of bridges for the city until his recent entry into military service. Curtis Hill is the city engineer. The work was let in two contracts. List & Weatherly have the contract for the north branch of the road, and List & Gifford that for the south branch. Exclusive of pavement, the road will cost about $169,000.

Further Data on Chloramine from Denver

Recent results from experiments with chloramine for sterilizing the water furnished to the city of Denver indicate that 1% solutions are somewhat more effective than the 10% solution formerly employed. In June, 1917, the chemist of the Denver Union Water Co. began to experiment with chloramine to ascertain if it were possible to rid the treated water of aftergrowths, to which the filtered effluent had been subject for years. (For these results see *Engineering News-Record*, Aug. 2, 1917, page 210.) The minimum dose to obtain results was 0.13 p.p.m. available chlorine and 0.065 p.p.m. of anhydrous ammonia. This was added in 10% solutions until Sept. 1, when a new apparatus was installed permitting a 1% solution to be tried out. Dosage with stronger solution was maintained on another supply, however, for purposes of comparison. As noted, the results indicated that the 1% solution gave more favorable results.

In the summer months, when microscopical organisms were plentiful, it was found possible to reduce the dose of ammonia applied to the lake waters. In winter the same water requires nearly twice as much as in summer; 0.24 p.p.m. chlorine and 0.149 ammonia. This increase was not found to be necessary in the river supply.

These experiments were conducted under the direction of D. G. Thomas, chief engineer of the Denver Union Water Co., after the appearance of an article in *Engineering News-Record* of June 21, 1917, p. 606, on the Ottawa investigation. Mr. Thomas has not yet completed his experiments.

Machine-Built Levees Found Cheapest

Levee construction by power-driven machinery includes the largest amount and lowest cost of such work in Louisiana. For the two years which ended with April 70% of the work was done in this way, as compared with 24% by mule-drawn scrapers and 6% by men with wheelbarrows. The cost per cubic yard was 15.14c., 22.04c. and 22.91c., respectively. These figures are given in the report of the Board of State Engineers for the period mentioned. The work done involved the handling of 23,413,268 cu.yd. of earthwork for 65.17 miles of new levee and 232.42 miles of old levees raised and enlarged. Its total cost was $3,987,138, of which $2,071,648 was paid by the levee districts, $691,526 by the state and $1,283,694 by the Federal Government.

Engineering Data Required for a Housing Project

Federal Bureau of Housing of Department of Labor Issues Instructions to Be Followed by Preliminary Investigators

ABOUT 40 per cent. of the cost of a modern industrial housing development is apportioned to engineering expenses; that is, to the surveying, water-supply, drainage, sewerage, roads and pavements and community lighting and heating, all of which are in direct charge of the engineer advisers or authorities on such work. The planning of all of these services cannot be attempted until a thorough study is made of the conditions at the site, with respect to their effect on the proposed design. To facilitate such a study on the projects now being undertaken by the Department of Labor's Bureau of Housing and Transportation, the engineering division, under the direction of John W. Alvord, consulting engineer, Chicago, has issued instructions which cover all of the points into which the investigator must look.

These instructions cover only the preliminary investigations, and form a part of a compendium of the engineering details of housing operations being compiled under Mr. Alvord's direction. The preliminary instructions are as follows:

General Conditions To Be Observed

Drainage—It is important to notice that the site can be well drained to ample depths required for cellars. High, slightly rolling or gently sloping land at least 15 to 20 ft. above an available outlet in the immediate vicinity is highly desirable and ideal.

Low Lands Available—Low marshy land with no marked drainage lines is not to be entirely avoided, because it can probably be developed, but at considerable expense for grading or pumping the sewage and drainage, which expense must be added to the cost of the land and should be kept in mind for purposes of comparison.

Marked Natural Drainage—Gently sloping land, with well marked natural drainage lines traversing it, is desirable, as the cost for natural drainage is lessened and desirable open spaces are increased.

Broken Land—Very broken land, with accordingly rugged topography, all requiring a great deal of heavy grading to render it habitable, is to be avoided for present purposes.

Desirable Sandy Land—Sand soils, with low ground-water level and good outlet, are desirable, although expensive to develop fully. The disadvantage of expensive black soil importation offsets in part the naturally good drainage, dry cellars, and cheap storm water removal available.

Undesirable Sandy Land—Sandy soils with high ground water and poor outlet facilities are expensive, for the construction of underground work.

Clay Soils—Close clay soils are not entirely desirable, as surface drainage will be largely increased, especially where steep slopes prevail. Stiff clay makes for expensive pavements, imperatively needed, and often cellar drainage must be especially provided.

Gravels and Sands—Sandy gravel, even containing some clay, makes an excellent site, particularly when porous and combined with low ground-water level. Such a site needs a minimum of street pavement or, at best, inexpensive pavement, and the drainage system will be much cheapened. Excavation is also less costly than in some other soils.

Sites Best for Streets—The topography best suited for streets will furnish grades less than 0.3 or 0.4% and not greater than 4%.

Corporate Limits—It is important to note whether the proposed housing site is inside corporate limits of the municipality and, if it is not, to ascertain possibility and terms for connections with existing municipal public utilities.

Important Sewerage Details

Connection to Existing Systems—The available outlet for the sewers must be fully investigated. If this is through an existing sewer in a neighboring sewer system, ascertain if it is large enough, where it empties, and what, if anything, it imperils. Report type of sewer system, whether sanitary, combined or storm water

Note approximate drainage areas, direction of flow and relative surface elevations, with particular reference to the necessity and approximate size of storm sewers and open ditches.

Long Outlet—If long outlet sewers are necessary for connection with neighboring sewers, ascertain their cost and how this may compare with other possible outlets.

Legal Status—Investigate if local sewers in adjacent systems can be legally used without payment. If proposed housing quarters are outside corporate limits, can connection be made with sewers in the corporation?

Special Assessment Laws—Always check general statements about the use of adjacent sewers by consultation with the city authorities and particularly see the special assessment laws and ordinances by which such sewer districts were formed and such sewers paid for

Constructive Questions—Ascertain soil conditions as to cost of construction on the proposed site. Will the banks stand up alone? To what depth? Quicksand? Rock? Ground water?

Local Material—Are there local supplies of building material? Lumber? Cement? Sand? Gravel? Broken stone? Prices?

Local Contractors—Are there local contractors and builders? What equipment is available, such as trench machines, concrete mixers, grading outfits, steam shovels, teams, motor trucks? Find recent contract prices for sewers, paving, curbs and sidewalks.

Transportation—What are the railroad switch and transportation facilities for delivery material?

Local Labor—Investigate local labor situation with reference to available carpenters and laborers.

Selection of Sewer Outfalls

Outfalls to be First Considered—As the sewerage and drainage are in many ways affected by the ultimate method of sewage disposal, it is essential that investigators should obtain the data for the proper solution and approval of that problem.

State Control—In most states the state board of health has control of the sanitary standards to be observed, and in some cases they issue rules, directions and, in other cases, have well defined policies which it is important to know and follow.

Detailed Approval by State Authorities—Where state board of health or other authority controls stream pollution, it is usual to find that the law provides that it has final approval of all plans and specifications. This should be kept in mind.

Extension of Existing Facilities—In localities where sewerage facilities exist, extension of such facilities is presupposed, unless the state authority or good practice requires their revision or rejection.

Local Practice—In developments which are contiguous to municipalities or are parts of municipalities, the practice and method of such municipality should be followed if good, and followed and supplemented by good practice where desirable.

Isolated Developments—Where developments are not adjacent to settled territory of any description, standards must be outlined, future expansion taken into account and especially complete information obtained.

Stream Pollution—In general, streams should not receive raw sewage from isolated developments unless the extreme low-water flow of the stream exceeds about 5 cu.ft. per second for each 1000 of the probable future population.

Provision for Future Tankage—In every case, where possible, outlet sewers should be at such elevation that sewage treatment by tankage can be readily introduced in the future, if required.

Outlets—In the cases of all considerable streams into which the contents of sewers are discharged, good practice would suggest that submerged outlets conveying the normal flow should extend out into water of such depth that the sewage will be quickly diffused and not easily observable. Overflow at the shore line may provide for abnormal flow.

Tidal Outlets—In cases where outlet sewers empty into tidal estuaries, special studies are necessary to be assured that freedom from offensive conditions will be obtained. In some cases, where elevation is lacking, it may be necessary to store the sewage temporarily during high tide; and in other cases it may be desirable for other reasons to release the sewage from storage reservoirs on the falling tide only.

Partial Treatment—In cases where the low-water flow of streams available for sewerage is less than about 5 cu.ft. per second for each 1000 of ultimate future population served, treatment works should be planned for, and if the population in the near future requires such works should be introduced more or less completely, as circumstances appear to render necessary.

Complete Treatment—In cases where the sewage must be emptied into a stream quite insufficient in flow to deal properly with it, treatment works of a reasonably complete character must be introduced.

Complete Plant for Extreme Cases—No sewage or polluted storm water should be discharged into a stream used as a source of domestic water supply at any point where it may possibly contaminate such water supply.

except in the most extreme cases. When it is absolutely unavoidable to divert the sewage from a stream used as a source of water supply, treatment plants of the most complete and reliable character should be introduced. A site involving the above conditions is undesirable, and should not be selected if it is possible to avoid it.

Provision for Future Treatment—Where it is likely that while the present population may safely empty sewage into streams, the future population can probably not do so. Space and elevations should be left so as to provide for the possible future installation that may be necessary.

Treatment Sites Removed from Population Areas—Sewer outfalls liable to require treatment plants should not be located in or near thickly populated or residential property, if it is possible to avoid it.

Long Outfalls Avoided—Long outfall sewers are to be avoided if possible, where the liability to introduce treatment works is only a future possibility. Short outfalls to the nearest outlet may be selected, but at such elevation that intercepting sewers to more distant outfalls can be introduced when found necessary.

Water-Supply Details

Extension of Existing Facilities—Available water supplies already developed should be examined in detail, to ascertain that they will be satisfactory from the standpoint of (a) quality; (b) quantity, and (c) pressure.

Water-Works Information—Water-works information should include: (a) Type and capacity of pumps; (b) average daily supply; (c) population served; (d) pressure near point of extension; (e) relative elevation of proposed site; (f) size of main supply pipes to site; (g) reservoir and standpipe elevations or storage.

Cost of Connecting Mains—Where connecting mains outside of the site are not sufficient in size or are deficient in pressure, the cost of supplying these deficiencies should be approximately ascertained, if possible, and also inquiry should make known whether that cost will be assumed by the municipality or water company.

Water Rates—Ascertain whether water is sold in adjacent territory by meter or flat rates or in part; both what these rates are and what policy the water company or department will have in the matter of the housing development, particularly if the proposed housing quarters are outside of the corporate limits.

Cost—Ascertain whether the extension of water mains within the housing development site will be a direct charge or will be amortized in the rates.

Pressure—Find out whether the pressure is deficient, whether new and higher pressure can be generally installed, whether a high service district is necessary, or whether booster pumps or storage will be needed.

Fire Engines—Ascertain whether fire engines are used or extra fire pressure, developed at the pumping station, is used for fire service.

Poor Supply Quality—Water supplies from surface supply unfiltered are to be looked upon with suspicion, and, generally, arrangements should be urged, if possible, for their filtration or, at least, sterilization.

Contamination by New Housing—Water supplies in adjacent developments should not be imperiled by the installation of the new housing developments in such manner that the sewage will reach their source.

Special Report—If entirely new supplies must be developed, an experienced water-works engineer should report especially on the possible source and the cost of construction and operation, and should show the resulting rates as well.

Streets and Pavements

Situation—Note location of the proposing housing site with reference to street connections of the municipality. Is the site on a main thoroughfare? Will extensive street work be required to connect the housing site with the business and factory sections?

Soil and Drainage—As a well-drained site or one with gravel soil may materially reduce the necessity for expensive improved pavements, these features should be specially observed.

Grades—The best topography for street grades will run not less than 0.3% or 0.4% and not greater than 4%. Note the extent of grading required for streets and houses.

Local Practice—Observe the local practice as to types of pavement, street and pavement widths, curb and gutters and sidewalks, particularly where there are recently built industrial housing quarters or new real estate developments. Note whether alleys are used.

Local Materials and Prices—For approximate or comparative estimates, note the availability of local paving materials and prices, also recent contract prices for pavements, curbs and walks.

Electric Light and Gas

A good description of the local electric-light plant and gas company should be secured. Have they capacity? How connected up to site? Cost? By whom paid? Report on local methods of street lighting.

Investigate rates. Is there dissatisfaction in the community? Is it reasonable? Or unreasonable? Hear both sides to any controversy. Compare rates with other similar situation. See if there is any reason for abnormal rates. Are rates governed by State or other utility commission?

Is service good? Quality of gas? How determined? What ordinance requirement? Electric light: Are there breakdowns and stoppages? Why?

Will companies finance complete installation and authorize through rates or expect cash cost advance and rates accordingly?

What contractual relations otherwise may be reasonably expected?

Fleet Corporation Moves Quickly by Truck

Moving the offices of the Emergency Fleet Corporation from Washington to Philadelphia by motor trucks was recently accomplished with the loss of only one working day. Sixty trucks were used, and four round trips between Washington and Philadelphia were required to complete the transfer. These were made between the close of business on Friday and the resumption of business on Monday. The furniture and records of the corporation, which employs thousands of clerks and stenographers, were scattered in 39 buildings.

Thinks Utility Control a National Matter in War Times

P. H. Gadsden Tells Gas Associations Government Can and May Have to Assume Charge Even of Local Enterprises

LOCAL authority may have to give way to national control of all public utilities, P. H. Gadsden, resident Washington member of the Electric Railway War Board, told the American Gas Institute and the National Commercial Gas Association at a joint meeting of those organizations in New York June 6. According to his view, the same war exigencies that have impelled the Government to fix prices and otherwise assume control of many staple articles may cause it to take charge of local monopolies. He knows of no move in that direction as yet, but holds such action to be entirely possible.

Excerpts from his address follow:

The concentration of the entire activities of the nation upon the prosecution of the war has brought about a situation whereby practically all of the staple products and the manufactured articles of the country have become necessary to the prosecution of the war, and the activities of practically all of the great industries of the country have been diverted to that end. The fact that the operations of any industry under the exigencies of war have become necessary and essential to the nation's welfare immediately impresses upon that industry a national character and justifies the Federal Government in exercising the Federal power to regulate and control. To state it differently, the power of the Federal Government in a given case over an industry in time of war rests, not upon the fact that such industry may or may not be engaged in interstate commerce, but upon the more comprehensive basis that such industry, under the demands of war, has become necessary to the nation's welfare. When such a situation has been created, the power of the Federal Government, certainly during the period of the war and for a reasonable time thereafter, is paramount to that of the state.

What War Necessity Has Already Done

In pursuance of these general principles, we have seen the Government progressively fix the price of wheat, milk, sugar, etc., through the food administration; of anthracite and bituminous coal, and of coke, through the fuel administration; of pig iron, aluminum, steel, cement, lumber, hides and leather, and a large number of other basic articles, through the price-fixing committee of the War Industries Board. Within the past few days a textile administrator has been appointed, with large powers over the entire textile industry of the country. Prior to the war the Federal Government did not possess the power to regulate the prices of these articles. How then has it been derived? From the increasing necessities of the situation. As each article in turn becomes more and more necessary to the nation's welfare and more and more intimately connected with the prosecution of the war and the needs of the war program, it comes within the sphere of Federal control and becomes impressed with such a national character as to justify the national Government in regulating and controlling it.

The power exists, both to fix rates and to control the operation of public utilities. We have seen both powers exercised by the Government in recent months. In the case of coal, copper, sugar, aluminum, tin plate, etc., the necessities of the situation have up to this time been satisfactorily met by fixing the price. On the other hand, in the case of the railroads, we have the most striking illustration of the inadequacy of the regulation by price fixing. When it became apparent that the regulation heretofore exercised by the Government over the steam railroads of this country did not meet the situation, the Government unhesitatingly took the next step deemed necessary fully to meet the needs of the war program.

While so far as I know there is no disposition on the part of the administration at this time either to regulate the rates of public utilities or to take control of them, I think there is a growing recognition of the fact that the power to do so exists under the constitution, and if in the future conduct of the war the interests of the nation should make either course of action necessary, I do not believe there will be any hesitation on the part of the Government to act. Whether such action should be taken by the Government will, and should, depend solely upon the needs of the nation as they develop from day to day in the prosecution of the war. The necessity will create the authority to act.

False Bottom in Flume Doubles Flow

The South San Joaquin Irrigation District in California is served by a canal system in which is included a wood flume of 9½ x 14½ ft. cross-section. Joints between planks in the bottom of the flume are covered by battons, and transverse rods extend across it every 4 ft. just above the battons. These rods were put in after the flume was built, to strengthen the sides of the flume against horizontal thrust. The current is obstructed to such an extent by débris brought down by the current and lodged against rods and battons that it was decided to put in a false bottom.

This was accomplished by nailing down transverse 1 x 4-in. strips, 2 ft. apart, to which 1 x 12-in. boards were then nailed. It was not known just how much the false bottom would increase the volume, and the work was planned so as to interrupt the flow as short a time as possible and thereby keep the water loss down to a minimum. By making special effort, the entire job of putting in the false floor was accomplished in 28 hours' working time and the water was shut off only 48 hours. The work involved the distribution of 40,000 ft. b. m. of material over 2000 ft. of flume and the driving of 80,000 nails.

The water loss due to closing down was a negligible item compared with the greater volume obtained, for the false bottom decreased the resistance to flow to such an extent that the capacity of the flume was increased from the previous rate of 296 sec.-ft. when flowing 4.2 ft. deep to 622 sec.-ft. flowing 4.4 ft. deep—practically a 100% increase. The value of the co-efficient n was decreased from 0.0205 to 0.011.

The work was carried out under the supervision of R. W. Olmsted, chief engineer of the South San Joaquin Irrigation District.

LETTERS TO THE EDITOR

Comment on Matters of Interest to Engineers and Contractors Will Be Welcome

Improper Drainage the Cause of Most Highway Failures

Sir—I have read with considerable interest the article by A. A. Young on "Improper Drainage the Cause of Most Highway Failures" on p. 543 of the Mar. 21 issue of *Engineering News-Record*. Mr. Young has seized, with some skill, upon a few instances of highway failures and from them has seemingly attempted to draw an indictment of the whole highway engineering profession. I imagine that the state highway departments of the New England states, and of New York and Pennsylvania, could point out to Mr. Young the reasons for the few specific instances of failures which he gives or imagines, and it is not for one so far from the scene of conflict to review these specific cases.

It is probably true that practically all state highway departments have not used sufficient tile under drainage on their highway construction. I know that in Wisconsin we are placing about 10 miles of tile under drainage per year where we should probably place 50 miles. However, there are two sides to the controversy.

It has been said that the engineer who so designs all his structures that there never occurs even a partial failure is over designing and wasting the builders' money to save his own reputation. Applying this principle to highway work, the highway engineer who builds thousands of miles of highway without evidences of weakness developing on any of it has over designed a large fraction of the mileage. It is cheaper to fix up and rebuild, if necessary, a few hundred feet, here and there, of a road which has failed or partially failed, than it is to build a road which fails nowhere.

For instance, we build in Wisconsin something like 700 miles of surfaced road each year. We grade and drain it so that, if its conduct is anywhere near normal, it will serve its purpose. We under drain those spots where local report, the surrounding terrain, or conditions developing at the time of building indicate that under drainage is necessary. We normally expect that weaknesses will develop in unexpected places, and plan for fixing these weaknesses the succeeding spring. Possibly ten miles of this highway shows the need of additional material, additional drainage or additional ditch outlets. These ten miles are fixed up at a much less cost than would have been the extra cost of preventing any occurrences of the kind anywhere on the 700 miles.

Many engineers are proceeding on the basis that if a road is regraded and redrained its future conduct is so problematical that it is best to see what is going to happen rather than to provide in a costly way against what they believe may happen. The essence of good engineering is to design economically; not always to "play safe" so that one never has a failure.

The hindsight of Mr. Young is seemingly excellent. I wonder, were he the engineering head of a state highway department now, what type of road structure as to width and character of surface he would design so that ten years from now his successors would not be able to criticise his structures. Most of the failures in highways today are in the macadam structures built several years ago, and in those years highway traffic has suffered a greater change than in the 30 years preceding 1900. Most of the older American railroads have been rebuilt several times within the past 50 years. Has there been any great amount of criticism of the original builders, or is the verdict that they built wisely with the funds available for the traffic in sight, with the expectation that as traffic developed and more funds became available, the alignment and grade and type of structures, ties and rails would be adjusted to the new traffic, and that there would be money available to adjust it as the new traffic became able to pay for it?

In 1908 there were in Wisconsin about 5000 automobiles and motor trucks, traveling possibly 150,000 miles on our public highways. In 1918 we will have about 200,000 automobiles and 10,000 motor trucks, traveling on our country highways more than 700,000,000 miles. This alone is more than double the total vehicular traffic of ten years ago, and in addition each mile of it is much more destructive than a mile of horse-drawn traffic. Is it any especial wonder that highways built 10 years ago, or even five years ago, should fail under this vastly increased load, part of it traffic moving 10 to 15 miles an hour with three or four tons on each wheel?

Of course, it will be asserted that highway engineers should have foreseen this traffic immediately after the automobile and the motor truck were invented. Possibly so, but can anyone now predict the character, speed and amount of motor traffic in 1928, especially when the character of this traffic will depend to a great extent upon legislation which will be formulated and passed by the legislatures of 48 states? Highway engineers will appreciate it if the wiseacre who can will come forth and enlighten them.

We make the confident assertion that never in the history of engineering has any class of engineers been forced to design structures with so little positive knowledge of the character and amount of loads to come on these structures as have highway engineers in recent years. Furthermore, we believe that there was no stage in the development of the American railroads when the traffic changes were one-fourth so great in a five-year period as have been the changes in the traffic using highways from 1913 to 1918.

Mr. Young's statement that it is inadvisable to put surfacing on a subgrade until two years after regrading is possibly academically correct, but if Mr. Young has ever torn up a surface which was at least passable and left a surface which was impassable on a main traveled highway, he will realize that the public demands this covering of grading at the earliest possible moment, and that this demand is backed by good solid American (if not polite) language and action. Roads would be better if built up in layers and cured for two to ten years before surfacing were put on them, but the state highway department which used this method of building would not remain in existence beyond the time the next legislature met to put it out of business.

As to the piecemeal work—doing a piece here and doing a piece there and not benefiting the general condition between points—Mr. Young's criticism is again scientifically correct, but he forgets that, in general, construction is not selected by the engineers but by the people or representatives of the people, and that usually the engineer is simply told to build here or build there and has no part in the selection.

Even where the state highway department ostensibly controls the selection, it must distribute the work of any year fairly throughout the state, or else the work will stop suddenly the first time the people have a chance to get at its control.

The piecemeal character of American highway construction is not the fault of the highway engineering profession. It is one of the things inherent in the American form of government, and until the people in America are willing to surrender their rights of self-government in affairs of this kind (which will probably be never), highway engineers will have to lay out and do work not always in accordance with the principles which they know are right, but in accordance with the principles which they know will get the support of the taxpayers, without which support the whole work dies.

Some may say that it would be better, then, not to do the work at all. If this theory of legislation and action had been adopted, highway work would have died aborning in America. It has been largely a matter of education so far. A few states, notably Maryland and California, have gotten to the stage where the work is laid out and built on true economic principles by a central organization. But if history is examined, it will be found that both of these states, especially Maryland, started out with a State-aid system, utterly without principles of selection of work or a general system of roads on which to work. The present development in these states has been a matter of education. The people will not believe that their method is not the best method until they have seen its failure with their own eyes.

In the same way, in all other states, it has been necessary and will continue to be necessary to build piecemeal and uneconomically in many cases with the idea of educating the people to the fact that this method is wrong, so that the people themselves will demand and support the thing which is right. You cannot educate the people from the top down; you must educate them from the bottom up, and the only kind of public education that amounts to a row of pins is the education of bitter experience.

The American highway engineer has had and will continue to have an especially difficult problem. He deals with the public and public opinion much more than does any other engineer. Others can well sit far from the scene of turmoil and say that if thus and so cannot be done, nothing should be done, and that this type of road is uneconomical, and that this thing is foolish. But being in the thick of the battle, starting work in a state with a million or five million citizens uneducated as to the underlying principles of road selection and construction, and getting them to finance or build types of road which are ahead of or even equal to the immediate necessities of traffic, is a different matter. As for getting the public to pay for roads which are expected to be the right kind of roads 15 or 20 years from now, it has not been done in America, and we doubt whether it can be done.

Practically every state highway department knows that if we are to accommodate the traffic which we know is inevitable we should build on our main lines of travel concrete bridges not less than 30 ft. in width, and that our surfaces should be at least 20 ft., and better 24 ft., in width, of concrete, vitrified brick or bituminous concrete or sheet asphalt on a concrete base, and that on many of the more important trunk roads we should build the equivalent of a city street with curb and gutter. Yet there is not even today one state the people of which will support or finance such construction. We know as well as do the armchair wonders what is the logical and economical road to build. Possibly the armchair boys could get the people who pay to finance such roads and support their construction. If so, all of the present state highway departments should be eliminated and their places taken by the boys who know what should be done and can get it done.

There seems always to be open season for those who wish to criticise highways and those in charge of them, and the sport, while popular and fascinating to the gunner, some times palls upon the game. The criticisers are about the only ones who have preserved their highway reputations. Possibly the fact that they have built little or no highway and have never been in administration control of real work accounts for the phenomenon of their unsullied reputations.

ARTHUR R. HIRST,
State Highway Engineer of Wisconsin.
Madison, Wis.

Sir—"Confession is good for the soul," and although Mr. Hirst accuses me, in the first paragraph of his article, of exaggeration and misstatement, in the second paragraph he confesses his own shortcomings in the matter of comment on underdrainage.

When and where do highways fail? Is it in the summer or fall, when everything is dried up and the farmers are praying for rain? Is it on top of a gravel ridge where the natural slope of the land is away from the road in all directions? I leave the answers to the critics of my article on highways.

Since I am accused of seizing "with some skill upon a *few* instances of highway failures," I am forced to make an assertion which reflects no credit on the highways building profession. I make it only in self defense. Divide the highways of New England into sections of 25 miles each, and investigation will show that 75 per cent. of these sections fail or show signs of failure within three years of the time when they were opened to the public, and many of the failures occur year after year.

I know of one stretch about five miles long, built about six years ago at a cost of $12,000 per mile, I am told, 30% of which failed the first year it was opened to traffic. The same 30% has failed every year since. If the "highway departments of the New England states could point out the reasons for the few specific instances of failure," here is a little 5-mile stretch all ready for the pointer. It would be first-class

practice for any highway department to correct this 30% yearly failure. Right here I would like to ask Mr. Hirst one question. If he believes 50 miles of underdrain should be placed where 10 are now being placed, what excuse has he for not placing the other 40 miles?

In the matter of "overdesigning," if Mr. Hirst's statement is true (and *I* do not dispute it), then 50% of the state highways in the North and East are overdesigned.

"Fix up and rebuild" within a year or two after completing a highway costing $10,000 or $12,000 per mile is a mighty poor recommendation for anyone, no matter what his title may be. I question the possibility of properly "fixing" one-half of the failures which show up after a road is surfaced, because modern highway *surfaces* are so excellent that the effect of a cause may show up many feet from the source of the trouble. In five years' experience with a modern highway surface over water mains, I have seen many instances of the water from a break showing up from 5 to 30 ft. from the burst.

"If Mr. Young were the engineering head of a highway department," there are several things he would do. First, he would have prominently displayed in his office a placard with this legend: "ALL ROADS AND HIGHWAYS MUST BE KEPT OPEN FOR TRAFFIC IS POSSIBLE. Only allowable exceptions are rock cutting and bridge building." This same placard would be displayed in every branch office. Second, he would follow the suggestion of the highway engineer of Missouri and have a slip bearing the word "drainage" pasted or sewn in the work-time hat of every practical worker in the department. Some few other innovations probably would suggest themselves as the work progressed, but the above will suffice for the first lesson.

If Mr. Hirst will *read* my article on highways, not just glance through it, he will fail to find anything which suggests "tearing up a passable road surface and leaving it impassable." That practice is the work of the *real* "armchair wonder," who sits in his office and designs a highway for an unknown (to him) traffic, over an unknown terrain; and having designed it, he gives it to a contractor with instructions to do with the road as he pleases. The contractor immediately tears up a part of the surface, and the public is told, and not always pleasantly, to go to—well, you know!

I thank Mr. Hirst for the support he has inadvertently given to every statement of mine. In drifting off into probabilities of the future, Mr. Hirst "has nothing on grandpa," nor great-grandpa either, for if he will visit me, I will take him over the famous 10-rod-road laid out and partly worked more than one hundred years ago, from Wickford, R. I., to the Connecticut line. There I will show him stone culverts, not 30 ft. wide, but 150 ft. wide, and some of the road worked in proportion.

I never knew the American public to be very much concerned over the future needs of roads, but it is in very much the same state of mind as a man I knew in Providence, R. I., some years ago, before the automobile was thought of. This man had inherited some money. After a few days, he decided that to complete his pleasure he needed a horse. Repairing to a livery stable, he told his wants. The stable-keeper brought out a horse, which he described as one which had been a good one, but the purchaser was not interested. Then a young horse was shown, and the stable-keeper dilated on what a great horse he was, in the making. The purchaser again shook his head and remarked, "I don't want a has-been nor an is-to-be; I want an is-er." The great American public is not interested in "has-beens" nor "is-to-bes"; it wants "is-ers." Can the highway profession build "is-ers" at a cost which the public can afford to pay?

To paraphrase a famous statement of one of our great legal lights, I shall enter upon no encomium upon my article on highways; there it stands, and there it will remain until the fallacy of one single statement therein contained or method therein outlined is shown.

We are after a solution of one of the great questions which confront the American people; is there not someone who can take up the discussion on its merits? A frank discussion of problems which everyone knows to exist, but whose existence the highway profession refuses to acknowledge, certainly can't harm a profession which is very near to the slough of despond.

Jewett City, Conn. A. A. YOUNG.

South Dakota Highway Department Will Spend $400,000 in 1918

Seven Federal-aid highway projects, consisting of 70 miles of gravel road and three miles of concrete paving, are proposed in South Dakota for this year. Two State-aid projects under construction consist of 20 miles of gravel road. It is expected that about $400,000 will be expended under the direction of the State Highway Department. The Department is composed of the Governor of the State, the State Engineer, and the Highway Engineer, who are respectively, its chairman, its secretary, and its executive head. Homer M. Derr is state engineer, Elwin H. Quinney is deputy state engineer, and Frank S. Peck, is highway engineer. The force consists of an assistant highway engineer, a clerk and stenographer, and three field engineers, but it is expected that this will be considerably increased in the near future.

The State Highway Department has full charge of the construction and maintenance of all State-aid and Federal-aid projects and the bridges thereon, and a state highway fund is provided for this purpose. The tax for the fund cannot exceed 0.1 mill on each dollar of the assessed property valuation which for 1917 was $1,441,475,255. On all State-aid projects 50% of the cost is borne by the state highway fund, and the balance is borne by the county or counties in which the project is built. The county also bears 50% of the cost of all Federal-aid projects.

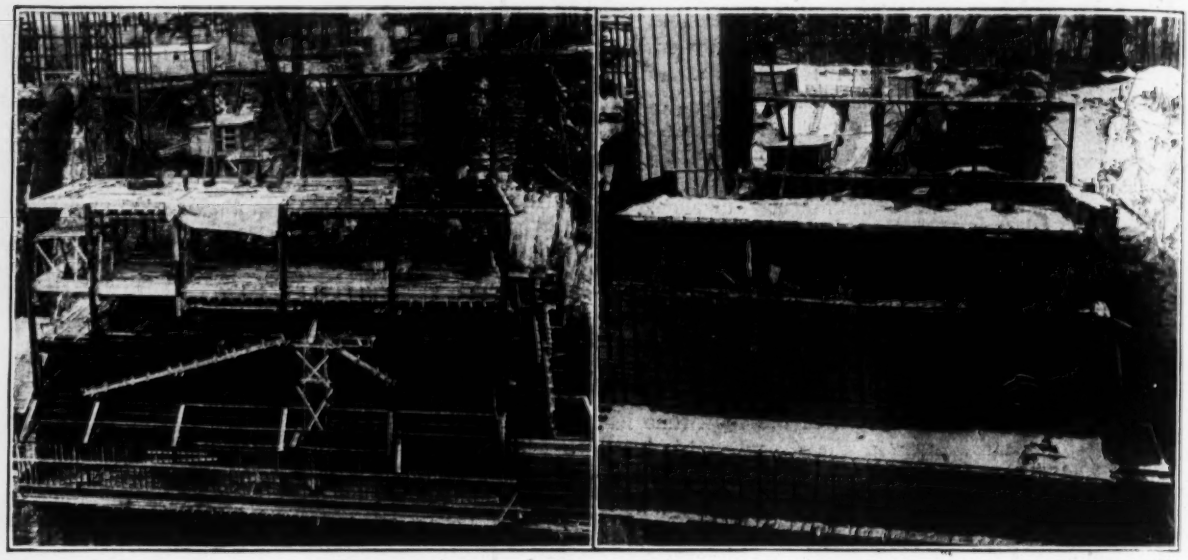
A road levy not to exceed 2 mills, and a bridge levy not to exceed 1½ mill, and are made by each county, and expended upon roads and bridges within the county as directed by the county commissioners. The standard plans and specifications for all county bridges are furnished by the office of the State Engineer and his office has supervision of the construction of all bridges costing more than $3000.

HINTS FOR THE CONTRACTOR

DETAILS WHICH SAVE TIME AND LABOR ON CONSTRUCTION WORK

Placing Building Concrete at Thirty Degrees Below Zero

TIMBER sheathing around the steel frame of the building was the main protection afforded for winter concreting of the floors and walls of the new power house for the Trenton Falls, N. Y., plant of the Utica Gas & Electric Co., approaching completion. The steel frame was completed last December, and the lower two floors were then sheathed as shown in the view. The sheathing was lined inside with building paper and a steam heating boiler with numerous steam coils, together with salamanders, kept the interior temperature high enough to permit the placing of the concrete during the very cold weather of last January, when 30° below zero was registered several times. When the walls had been completed to the level of the second floor, the lower portion of the housing was removed and built up around the second floor to protect the concrete walls at that story. No trouble was experienced during the progress of the work with frozen concrete.



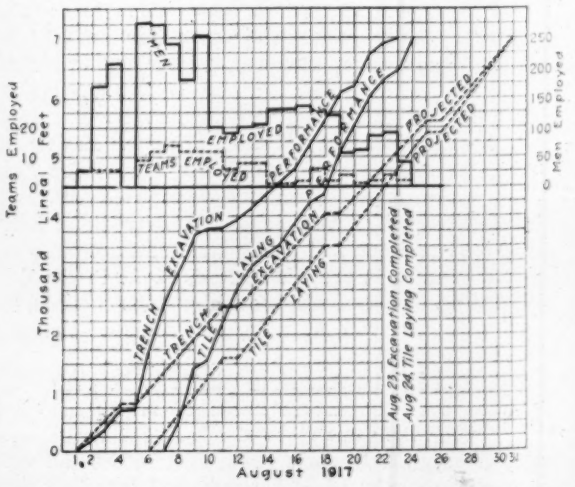
POWER HOUSE STEEL FRAME FINISHED IN DECEMBER AND THEN ENCASED WITH SHEATHING TO PERMIT CONCRETING IN SEVERE ADIRONDACK WINTER

Progress on Different Divisions of Work Kept Even by Charts

PROGRESS charts on sewer construction at Camp Lewis, American Lake, Wash., were used with great success by the superintendent to keep the various divisions of the work balanced as to men and material, so that all the work would be completed at the same time. They were also used to gage the probable date of completion and in making reports to the contracting quartermaster and the contractors' advisory committee.

When the plans had been made, and as each division was released by the engineering department, a progress chart was immediately made up, a projected progress charted, and an estimate made of the men, teams and materials required. These were immediately assembled and the progress charted daily. Sept. 1 was the projected date of completion in every case.

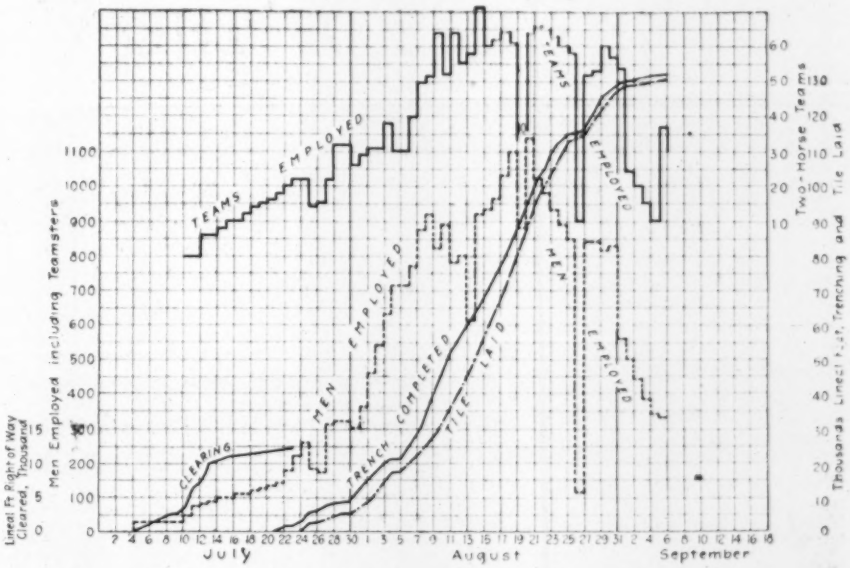
It was found as the work progressed that the line of



PROGRESS CHART, SOUTH TRUNK SEWER, CAMP LEWIS

progress on the chart indicated an earlier date of completion than that projected. After careful study of the charts a new date was set as Saturday night, Aug. 25, and the distribution of labor and material was made with this date in view. All work embraced in the original plans was completed on that date, the last piece of tile to make the connecting link on each division being laid on the same day.

The accompanying illustrations show the chart for the south trunk sewer and the combined progress chart for the whole system with the projected and actual lines of progress plotted. The distribution of men and teams was plotted on the same charts.



COMBINED PROGRESS CHART FOR ENTIRE SEWER SYSTEM, CAMP LEWIS

The work was performed by the Hurley-Mason Co., contractors. F. J. Walsh was superintendent and P. H. Van Etten assistant superintendent of sewer construction.

Girders Erected by Gallows Frame That Leaves Tracks Clear

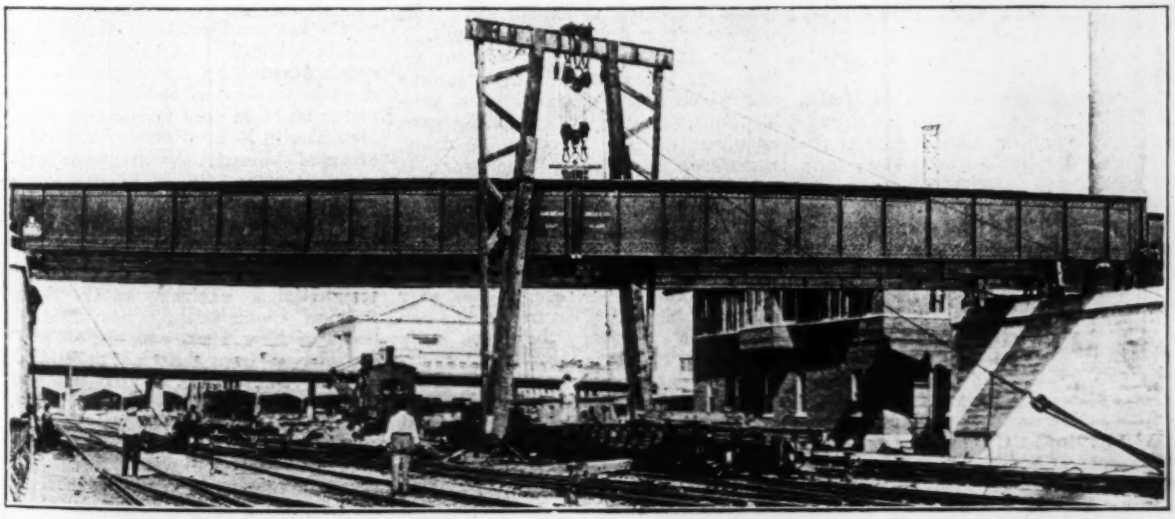
By F. W. Epps
Topeka, Kan.

THE photograph shows a gallows frame used in Kansas City where heavy traffic on six main lines left little opportunity for using ordinary erection equipment. This frame did not block any of the tracks and left all but one open for traffic during the actual operation of erecting the 70-ton girders, which are 127 ft. long and 7 ft. 4½ in. back to back of flange angles.

In erecting the girder it was brought out on the track between the legs of the derrick and raised and turned into position. A switch engine was used on this track to operate the hoist line. G. E. Tebbetts was bridge engineer of the Kansas City Terminal Ry., for which the work was done, when these girders were put in.

Meters Hold Down Water Consumption

Of the total receipts for water in Toledo, Ohio, last year, 99.1% were received from metered water services. Of the 38,022 active services, 97.0% are metered. Toledo uses 84 gal. of water per capita per day and 431 gal. per tap. Despite an increase in total expenses of 32%, the combined low-service and purification plant output cost per million gallons was $13.21 in 1917, a reduction of $2.87 from that of the previous year. However, the high-lift station cost was $9.68, an increase of $2.24. Coal cost 76% and labor 22% more than in 1916. The duty increased from 81,500,000 ft.-lb. to 92,000,000 ft.-lb., to the satisfaction of the city officials, it was asserted.



FRAME SET 127-FOOT GIRDERS OVER SIX BUSY TRACKS, LEAVING FIVE CLEAR DURING ACTUAL ERECTION

NEWS OF THE WEEK

New York Subway Work May Stop

Halted by Strike and Failure of City to Adjust Contracts May Prevent Resumption

New York City may have to do without its new subway system till after the war, in the opinion of those familiar with the situation, unless the city administration acts under the new Lockwood law to adjust the construction contracts within a very few days.

The union subway workers precipitated the crisis by striking on June 10 for higher wages, which the contractors had been paying since June 1, but were unable, it is said, to continue without definite assurance of an adjustment of the contracts. The union officials stated that, in view of the urgent demand for construction workers at much higher wages, they would be unable to hold for more than 48 hours their 7000 members who quit work, pending a definite decision by the mayor.

Officials of the Public Service Commission for the First District, legally charged with carrying out the work, for which the Board of Estimate of New York City appropriates the funds, and officials of the General Contractors' Association, many members of which hold subway contracts, profess themselves at a loss to understand the point-blank refusal of Mayor Hylan to take advantage of the Lockwood law. This law, as noted in *Engineering News-Record* of Apr. 18, p. 789, was signed and approved by the mayor himself, and provides that the subway contracts may be adjusted by the city's taking over the work and utilizing the contractors' equipment and organization to complete it at the actual cost since April, 1917, when this country entered the war, without any profit to the contractors. It was noted also in the issue of Mar. 28, p. 634.

A statement issued by Mayor Hylan, on June 10, to the effect that an adjustment of the subway contracts under the Lockwood law would cost the city from $25,000,000 to $50,000,000 was answered by F. L. Crawford, president of the General Contractors' Association and holder of several subway contracts, with the statement that less than the smaller amount is yet to be spent on all contracts now in force. He said:

"The new subway system requires an investment by the city of something over $200,000,000 and a further investment by the companies of over $100,000,000. The work on this system was started prior to the signing of the operating contracts and when we entered the war on Apr. 6, 1917, $130,000,000 worth of construction work was completed, leaving 28 contracts of a total of about $70,000,000 of work still under construction. These contracts were dated, some in 1914, some in 1915 and the last one in December, 1916.

"On these contracts, up to Apr. 1 last, the increase of the average rate of wages paid was from $2.25 per day to $3.84 per day. About one-half of the material that was required in the construction increased a similar amount. The other half of the material required was contracted for without any material increase in price.

"On these contracts the contractors have sustained a loss due to an increased cost caused by the war of about $7,000,000, of which $4,500,000 was increased war cost since Apr. 6, 1917.

"The total amount of work necessary to finish these contracts does not exceed $15,000,000 and as the scheme of adjustment voted upon by the Board of Estimate last Friday provides for the city paying the cost of this work, your disapproval of the Lockwood law really is confined to paying the excess war cost from Apr. 6, 1917, to date.

"The fixed charges now running on the total investment in the subways and which are a charge against construction, are nearly $15,000,000 a year, or about $40,000 per day. A delay, therefore, in finishing this work is probably the most expensive thing that the City of New York can indulge in.

"The members of this association have done hundreds of millions of dollars' worth of public work for the City of New York. No member has ever defaulted his obligation to the city and under this emergency they have every one stood up under these adverse circumstances to the verge of bankruptcy. As president of this organization, I make this statement with a good deal of pride and I feel that it was unfair and unjust to have expected us to carry all of the burden imposed upon this work by the war."

More Engineer Reserve Officers Are Wanted in Army

Chief of Engineers Must Fill Two Thousand Vacancies in Grades of Captain and First Lieutenant

(Washington Correspondence)

Engineers are once more in demand for officers in the Army. For the past six months all applicants for engineer commissions have been met with the statement that the quota was full and that except for special work, generally at the direct request of General Pershing, no more commissions would be given in the engineers to men now in civil life. Such vacancies as would exist were to be filled by promotions of men already in the service. Our enormously increased army, both in being and in prospect, has changed all this. Under date of June 3, Gen. W. M. Black, chief of engineers, U. S. A., issued a call for approximately 2000 additional first lieutenants and captains in the Engineer Reserve Corps, to be immediately commissioned, sent to training camp and as soon as possible thereafter sent overseas to the Expeditionary Forces.

Qualification restrictions are mainly those of age. There are no commissions available in the grade of major or higher, or in that of second lieutenant. The higher grades will be filled by promotions of well qualified men now nearly a year in the service, the lower grades will be filled from the ranks or from the recent college graduates, members of the Engineer Enlisted Reserve. The age limits are 32 to 36 years for first lieutenant and 36 to 42 years for captain. These limits may be slightly increased, or decreased, in certain cases, except that no one within the draft age will be considered.

QUALIFICATIONS NOT SPECIFIED

No set rules as to professional qualifications and experience have been established, except that the applicant must be engaged in the active practice of the engineering profession, in one of its various branches. An examining board will pass upon the candidate's fitness. All applicants of course must be citizens of the United States, and must be in good physical condition. Men now in Federal service will not be accepted unless they are specifically

(Continued on p. 1152)

Resigns as Chairman of New York Service Commission

Oscar S. Straus has tendered his resignation as chairman of the Public Service Commission, First District, State of New York, and has asked to be relieved from duty not later than July 1. Mr. Straus became chairman in December, 1915, with the understanding that he would retire at the expiration of two years, but it was understood that he was subsequently asked to remain in the position for a longer period.

National Municipal League Discusses War Problems

Reconstruction Committee Created—Civil Organizations and Utility Problems in War Time.

"Preparedness for War and Peace" was the subject of the annual review of Clinton Rogers Woodruff, secretary of the National Municipal League, at the annual meeting of that body in New York City last week. The war found us unprepared for war, but peace should not find us unprepared for peace, was Mr. Woodruff's summary of his address. The league voted to appoint a committee on reconstruction.

At a joint luncheon of the league with the Governmental Research Conference and the Association of State and Municipal Leagues, a number of speakers dealt with the war-time work of civic organizations. L. E. Wilson, director of the American City Bureau, who acted as toastmaster, said that the best city in which to invest money is the one that anticipates the wants of cities in 1925. H. G. Otis, city manager of Auburn, Me., remarked that one of the tenets of the city-manager profession is the doing of a thing in half the time which it has previously taken to do it. Our military camps make use of the city-manager plan. Two camp utilities officers have applied for membership in the City Managers' Association.

Radical Federal Assumption

"Relations Between a Municipality and a Public Utility in War Times," was the subject of an address by W. L. Ransom, counsel for the Public Service Commission of the First District of New York. General Order No. 28, issued May 25 by the Director General of Railways, Mr. Ransom stated, assumes for the first time in the history of the country that a railroad wholly within a city or a State is subject to control by the Federal Government. This order affects railways wholly within New York City, with rates fixed by franchises, doing away with those rates, with no certainty as to whether the change is subject to review by any court. Some of the railway companies in New York City to which increase of rates have been refused by the Public Service Commission can now increase their rates—in one case by 600 per cent.

The State of New York, in the opinion of Mr. Ransom, has taken a more advanced stand than any other State in the matter of increases of rates sought by utility companies, in the face of the fact that their rates are fixed by the franchises under which they are operating. Hitherto courts, from time immemorial, have held that contract rates fixed in franchises must stand, but now that the shoe is on the other foot the courts in some States have held that the rule does not work both ways, and that the rates may be ordered increased notwithstanding the fact that they are fixed in franchise contracts. The New York Court of Appeals, in the Rochester case (where application was made to raise street railway fares to 6c.) has supported the home-rule powers of cities and held that a franchise cannot be altered without the consent of municipalities. This decision means that in New York State a company must come back to the municipality and make terms with it if higher rates are to be made, thus giving the municipality an opportunity to regain control of franchise companies.

Rising Utility Expenses Serious

That the rising cost which has to be met by utility companies is a serious matter was recognized by Mr. Ransom. He expressed the opinion that the Interstate Commerce Commission would have granted increased rates to railways if the commission had had the power to see that some of the increased revenue was used for upkeep and the making good of losses caused by depreciation. The billion-dollar loan of the Federal Government to the steam railways of the country is largely to repair depreciation not cared for by the railways. The same thing may arise in connection with municipal utilities.

In reading a brief report for the franchise committee of the league, Delos F. Wilcox suggested that the cities in dealing with the requests of public utilities for increased rates might give up the fixed-fare idea, but only on agreement that the city should have more control over the franchise companies.

Governmental Efficiency and Economy Discussed

How Federal, State and City Governments Have Helped and Might Do More

Some hundreds of representatives of Federal, State and municipal governments and of civic and other organizations gathered in New York last week to consider ways and means for securing greater economy and efficiency in public expenditures. This National Conference on War Economy, as it was called, was held under the joint auspices of the Academy of Political Science in the City of New York and the New York Bureau of Municipal Research, in coöperation with the National Municipal League. Before joining in the conference the league held its annual meeting in New York. The main topics considered by the conference were the financing of local governments, the Government as an employer, and the new era in budgets. At the meeting of the National Municipal League, the war-time work of the civic organizations and preparedness for war and peace were discussed.

At the War Economy Conference, Frederick A. Cleveland, of the Industrial Service & Equipment Co., Boston, formerly one of the directors of the New York Bureau of Municipal Research, opened the session devoted to executive leadership in a democracy by

(Concluded on page 1153)

Pick Five Government Yards for Concrete Ships

Fleet Corporation Lets Agency Contracts For Construction of 48 Vessels, Mostly 7500 Tons

Agency contracts have been let by the United States Emergency Fleet Corporation for the construction of 48 reinforced-concrete ships at five new yards, two on the Atlantic coast, one on the Gulf and two on the Pacific. Two of the ships will be the 3500-ton freighters just designed by the concrete ship department and the remainder will be 7500-ton vessels, some oil carriers and some freighters. The latter are now under design by the Emergency Fleet Corporation engineers.

The contracts are given in the accompanying table. All except that held by the Liberty Shipbuilding Co. are for 7500-ton ships; that company is to build two 3500-ton and six 7500-ton ships.

According to the terms of these contracts, the Government assumes all the costs of the yard and the ships, the contractor merely acting as an agent on terms not now announced. The yards consequently become the property of the Government.

Work on the Wilmington yard has been under way for some weeks, and is coming along in good shape. The other yards are about to be commenced. It is estimated that the first ship can be launched in about six months from the beginning of the yard construction. After that production can continue at a rapid rate.

In addition to the foregoing ships, the Government has under contract two others, one at Brunswick, Ga., and one at Flushing, L. I. The former is being built by the Liberty Shipbuilding Co. under an old contract; it is a 3000-ton freighter designed by the company under the supervision of the concrete ship department, and is well under construction. It will be launched, it is expected, about the middle of July. The second ship is also a 3000-ton freighter, designed under Government supervision by the Fougner Concrete Steel Shipbuilding Co., and being built by that company at its new yard now under construction at Flushing Bay, near New York City.

TABLE SHOWING AGENCY CONTRACTS FOR CONCRETE SHIPS

Location	Contractor	Home Office
Wilmington, N. C.	Liberty Shipbuilding Co.	Boston, Mass.
Jacksonville, Fla.	A. Bentley & Sons	Toledo, O.
Mobile, Ala.	Fred T. Ley & Co.	Springfield, Mass.
San Diego, Calif.	Schofield Engineering Co.	Philadelphia, Pa.
San Francisco	San Francisco Shipbuilding Co.	San Francisco

Engineer Reserve Officers Wanted in Army

(Continued from page 1150)

released by their present chiefs as not necessary to the conduct of the war.

A new method of selecting men will be adopted in the present campaign. Last year the candidates for commissions in the Engineer Officers' Reserve appeared before local army officers who passed on their fitness. These officers might be line men, artillery officers, medical officers or members of any branch of the service; in many cases, indeed, they had no qualification for passing upon the fitness of a prospective engineer officer as an engineer. These district heads reported upon successful candidates to Washington, where they were finally passed upon, but it is asserted that many well qualified engineers never got beyond the local boards, from which appeal was difficult. This year a special examining board, headed by Maj. Edward H. Williams, E. R. C., will tour the country, stopping at 33 cities, and will examine personally the candidates who have passed the preliminary examination, which consists in the filling out of certain papers to be sent to Washington.

Applicants Sent to Camp Humphreys

All applicants accepted by this examining board will be commissioned within a week or ten days of the examination, and a few days thereafter will receive orders to report at an engineer officers' training camp, either at Camp Lee, Petersburg, Va., or Camp Humphreys, just down the Potomac from Washington. After a course of training in military engineering they will be assigned to duty with the engineer troops for eventual service abroad. The commission is not given finally, however, because a candidate may in camp prove not to have the necessary qualities of a military leader. In such a contingency he will be honorably discharged. Just previous to the completion of his course of instruction each man's case will be carefully considered by a board of officers of the Corps of Engineers, United States Army.

The Government will allow traveling expenses at the rate of 7c. per mile to applicants who may be commissioned, and each man will also receive while in training camp the full pay of an officer of his rank. He must provide himself with the usual engineer officer's uniform, cap, puttees and tan shoes, but will receive a training uniform outfit while in camp.

Applications for these commissions should be made as soon as possible to the office of the Chief of Engineers, Washington, D. C. The office will send back a series of blanks to be filled out with a general personal description designed to indicate the fitness of the applicant for a more searching examination in person by the examining board. Those selected will be *notified* when and where to appear before the board for further examinations.

If you are between the ages of 32 and 42 and want to be a First Lieutenant or a Captain in the Engineer regiments soon to be in France, write at once to the Chief of Engineers at Washington for application blanks for the new Engineer Officers' Reserve Corps. Two thousand men are needed and needed now.

The present call for new members of the Engineer Officers' Reserve has an interesting background. As most engineers know, the reserve was formed before the war without any direct anticipation of its early use. It is generally recognized that without it the machinery of developing a proper engineer force last summer would have been immeasurably increased. As it happened, however, the system for commissioning engineers was ready, and by early summer a thousand or more engineer officers were available, and many thousands of applications were on file in the War Department for other officers. Beginning in June, the first officers' training camp started with 2500 men, all of high professional grade. Of them some 2000 were commissioned. A second training camp of 1500 men of similar professional quality yielded 1300 officers below the rank of major. By this time, however, it began to look to the department as though enough engineer officers were in sight, particularly as there were on file some 8000 applications for commissions which had not been examined because of the granting of the available commissions. Furthermore, the General Staff had figured that only a certain maximum of troops could be maintained in France, and that maximum demanded no more engineers above the grade of second lieutenant than were then in the service.

Commissions by Promotion

At this time the heads of the army laid down the general policy that all commissions, with rare exceptions in cases of specialists, should be filled by promotion from lower ranks, and that the second lieutenants should be obtained from the army itself, either from the privates or noncommissioned officers. Draft age men, particularly, were barred from consideration for commissions, except as they might be designated once they had taken their place in the ranks. This rule applied equally to the Corps of Engineers. Consequently, word was sent out that no engineer commissions were available to civilians, and the third engineer officers' training camp was filled with men designated from the ranks and with some enlisted men of long service who had been promoted to be second lieutenants. A few of the long-standing reserve officers, who got their commissions before last July, were also in attendance.

This third camp is understood to have proved quite successful, and some very good men were found in the ranks, so that the fourth camp, just starting, was formed on the same lines, except that the graduates of technical colleges who are members of the Engineer Enlisted Reserve were also included. This camp, however, is stated to have proved a disappointment in the class of men sent. It is frankly asserted in army circles that many regimental commanders, about to sail for France, seem to have purposely unloaded on the engineer school a number of their undesirables. Fully half of the men sent to the camps were said to be not only the poorest kind of material for engineer officers, but many, it is said, were lacking in the rudiments of a general education; most were lacking in the fundamentals of engineering.

Meanwhile, the demands for engineer officers were growing rapidly. The American Expeditionary Force was approaching the maximum laid down by the General Staff last year, and ships were in sight which made it possible to maintain about twice the early maximum. Railway troops, as noted in the news columns of this issue, had to be increased far beyond early expectations. And, finally, the specialist engineers, such as road builders, gas and flame, mining, etc., were found to be needed in larger proportion than first figured. It became imperative to increase the number of commissioned engineers of the army, and it was decided from the experience at Camp Lee that existing methods would not suffice.

The first step was to turn to the 8000 applications for the reserve which had not been touched. It was found that of these all but 300 were from men within the draft age, and of these 175 have already been commissioned, mostly as captains. There remained then the necessity of calling upon the engineers of the country to respond to another call for the reserve. This call has just been issued.

Draft Age Men Also Have Chance

Men below draft age are also to have a chance at the officers' camps. If already in the service they may make application through the proper military channels for assignment to camps, and the Chief of Engineers' Office will see to the disposal of acceptable men. If a man is within the draft age but not yet called, he should make application to the Chief of Engineers to be inducted into the service as a private, and later to be assigned to a training camp. Permission has been obtained to assign 650 men of this class. Obviously, men in each of these classes must have engineering qualifications. Their commissions, if granted, will be those of second lieutenants.

The increase in the army carries with it an increase in the enlisted engineer troops, who must be trained for special duties, both military and technical. For this purpose Camp A. A. Humphreys, on the Potomac, is being enlarged so that by fall it will hold

40,000 men, all engineers in training. Here will be the special engineering schools of all sorts both for enlisted men and officers, and here will also be the replacement regiments to make up the deficiencies in the Army at the front. At present, Camp Humphreys has only enlisted men, all of the officers being trained at Camp Lee, but the latter camp will be discontinued as an engineer officers' school probably after the present training camp is completed.

Governmental Efficiency and Economy Discussed

(Concluded from page 1151)

saying that the good that will come out of this war will not be the victory of democracy over Prussianism but over its own weaknesses. These weaknesses, in his opinion, are largely institutional. Federal, State and local governments should be reëstablished so as to hold the legislative branches responsible for policy and the executive branch for the execution of those policies, he said.

That State Governments have failed lamentably in the last half of the requisite just mentioned was asserted forcibly by Governor Lowden of Illinois. As our states have taken on new functions, new commissions have been created, but these new commissions have not been articulated with existing agencies, Governor Lowden said. A year ago last January, Illinois had 125 or more uncoördinated governmental agencies. These were theoretically responsible to the Governor, but under existing conditions, he declared, it was absolutely impracticable for him to hold these agencies responsible. The 125 or more boards and commissions have since been grouped, by legislative authority, into nine departments, the heads of which are appointed by the Governor.

"In contrast with this we see at Washington Congress creating and defining the powers of various bureaus in such a way as to leave no real authority with Cabinet officers," said Governor Lowden.

Financing Local Governments

At the session devoted to financing local governments, an address was made by Paul M. Warburg, vice-governor of the Federal Reserve Board, on "Capital Issues for State and Municipal Debts and Their Relation to War Financing." He urged that State, county and municipal authorities freely avail themselves of the advice of the Capital Issues Committee and that such advice be obtained in the early stages of projects.

Mr. Warburg expressed the hope that State and municipal governments will not insist that franchise companies fulfill onerous obligations. It is in the interest of the public, he said, that investments in utilities be protected.

Howard L. McBain, professor of municipal administration, Columbia University, expressed the belief that the national Government should control tax budgets as well as capital issues. This would not be so large a task as it might seem at first thought because the larger part of municipal expenditures is for fixed charges, so that Federal control over taxation need extend only to new expenditures, asserted Professor McBain.

The Pay-as-You-Go Policy

A separate place on the program was given to "the pay-as-you-go policy" in New York City. Charles L. Craig, comptroller of the City of New York, urged that this policy, by increasing tax rates, discouraged improvements in parts of the city which needed to be developed to increase real-estate valuation and to provide more revenue from taxation, and in general that the policy tended to result in high taxes, and increased mortgage and tax sales. Arthur M. Anderson, of the staff of J. P. Morgan & Co., New York City, expressed the belief that the pay-as-you-go policy was a very wise one up to the time of our entrance into the war. The 1918 legislation postponing the policy until a year after the war limits the life of bonds and that of the improvement they are to pay for, and is modeled in this respect upon recent New Jersey and Massachusetts legislation, which, the speaker thought, expresses the last word in municipal finance.

The Government as Employer

That the United States is the largest single employer in the world, and under better conditions than ever before prevailed, was stated by Thomas B. Love, assistant secretary of the treasury, who was the first speaker on the general topic, "The Government as Employer." Mr. Love's remarks related more particularly to the 2,300,000 soldiers and sailors in the service of the United States. For these the Government must provide a living wage, not only for the men themselves but for their dependents, including provision for the future and for possible loss of life or disability. The system of monthly allowances to dependents was outlined, as also the insurance system now employed. Up to June 5, the Government had in force 2,200,000 insurance risks, totaling $18,500,000,000. This total is nearly four times that of the insurance written by any single company in the world.

Speaking as a representative of the War Industries Board and the American Federation of Labor, Hugh Frayne made these unqualified declarations: "Labor is satisfied with government as an employer. Labor is loyal. This is not a rich man's war."

More Budget Reforms Needed

Budget reforms, accomplished and unaccomplished but greatly needed, were the subject of an entire session of the conference. W. F. Willoughby, director of the Institute for Government Research, Washington, D. C., said that budget-making is the least satisfactory element in our political institutions. The great mistake in our American government—from Federal to municipal—is in making legislative bodies boards of directors, Mr. Willoughby declared. Continuing, he said that the President of the United States and the Governors of the several States should receive full chief executive control, including the selection and control of all executive officers below them. A. N. Pierson, chairman of the Commission for the Survey of Municipal Financing in New Jersey, described the executive budget adopted by the legislature of that state in 1916. He suggested a permanent budget commission of experts familiar with the work of the various institutions of the state. Governor Lowden of Illinois said that it is an anomaly that the legislature of any State, a body which has nothing to do with the spending of money, should make up the budget. Governor Emerson C. Harrington of Maryland presented in great detail the scheme of the Maryland budget, or "the first state executive budget." Just prior to the enactment of legislation providing for an executive budget in Maryland, the legislature had passed appropriations which were $1,500,000 in excess of the revenue for the year.

In concluding the discussion, F. A. Cleveland stated that the main defect in American budget procedure projects has been in the means provided for the presentation of the case for the defense. The legislature should be considered as a mere jury or court of inquest over a budget, instead of framing it.

The separate sessions of the National Municipal League are reported on p. 1151.

District Railroad Directors and Federal Managers Named

J. H. Hustis and H. A. Worcester have been named as district directors by A. H. Smith, eastern regional director of railroads. Mr. Hustis, formerly president of the Boston & Maine R.R., will have charge of the New England district. Mr. Worcester, hitherto vice-president and general manager of the Cleveland, Cincinnati, Chicago & St. Louis Ry., will have the Ohio-Indiana district. Both Mr. Hustis and Mr. Worcester have risen from the operating departments.

Following the appointment of Messrs. Hustis and Worcester as district directors, other appointments for the Eastern region were announced as follows: P. E. Crowley, formerly vice president of the New York Central, was appointed Federal manager of the New York Central and the Lake Erie & Pittsburgh R.Rs. A. J. Stone, formerly general manager of the Erie R.R., was named Federal manager of the same road. F. P. Gutelius was designated general manager of the Delaware and Hudson R.R., and F. L. Blendinger was made general manager of the Lehigh Valley R.R. All of these men have risen from the operating departments, with the exception of Mr. Gutelius, whose first railroad work was in the engineering department of the Pennsylvania Railroad.

In the New England district of the Eastern region other appointments were announced, among which are the following: B. R. Pollock, Federal manager, Boston & Maine R. R.; H. M. Biscoe, Federal manager, Boston & Albany R. R.; E. J. Pearson, Federal manager, New York, New Haven & Hartford R. R. and Central New England Ry. Mr. Pollock and Mr. Biscoe have risen through the operating departments, and Mr. Pearson has risen through the engineering department of the Missouri Pacific Railway.

Among the appointments for the Ohio-Indiana district of the Eastern region are the following: G. L. Peck, Federal manager, Pennsylvania Lines West of Erie and Pittsburgh, and Cincinnati, Lebanon and Northern Ry., and Lorain, Ashland & Southern R. R.; C. W. Galloway, Federal manager, Baltimore & Ohio R. R. west of Parkersburg and Pittsburgh, and the Dayton & Union R. R.; E. M. Costin, Federal manager, Cleveland, Cincinnati, Chicago & St. Louis Ry. and the Cincinnati Northern R. R. All of these men rose through operating departments.

E. H. Coapman, operating vice-president of the Southern Ry., has been appointed Federal manager of that system, the Carolina, Clinchfield & Ohio Ry. and other lines. C. M. Kittle, vice-president of the Illinois Central R.R., has been made Federal manager of that system, including the Yazoo & Mississippi Valley R.R. W. L. Mapother, first vice-president of the Louisville and Nashville R.R., is made Federal manager of that road. R. V. Taylor, W. A. Winburn and J. H. Young are made Federal managers respectively of the Mobile & Ohio, the Central of Georgia and the Norfolk Southern, of which they have been officers.

Fairfax Harrison and Milton H. Smith, recently presidents of the Southern and the Louisville & Nashville systems, respectively, will remain presidents of the companies. C. H. Markham, formerly president of the Illinois Central R.R., is regional director of the Allegheny region of the railroad administration.

Stockholders of Boston Elevated Ratify State Operation

The law under which the State of Massachusetts is to undertake the operation of the Boston Elevated Railway system, as mentioned in *Engineering News-Record* of May 30, p. 1063, was accepted by the stockholders of the company at a special meeting June 3, and it is said that no doubt the $3,000,000 issue of 7% preferred stock, which the law requires, will be taken promptly.

More Railway Regiments

Five new regiments and 19 battalions of railway engineers are now being organized for service with the American Expeditionary Forces in France. Full details of the recruiting have not been announced.

Saving of Labor by Use of Rural Motor Express

Space for transportation of freight would be greatly increased, labor of over 100,000 men would be saved, greater production of foodstuffs would be fostered, and unnecessary pavement wear would be eliminated, if the Rural Motor Express and Return Load Bureaus were thoroughly organized throughout the country, according to some of the claims made at the meeting called by the Highway Transport Committee of the Council of National Defense, June 4 and 5. The men who met were members of the councils of defense of the various states, and transport committees appointed by them and was called for the purpose of organizing these agencies throughout the country. A brief summary of the discussion follows:

The return loads bureaus, it was stated at this meeting, have proved their worth in Connecticut in relieving the recent congestion, and the cost of maintaining a bureau is nominal, not exceeding $2500 to $5000 per year, according to the size of the city.

The Rural Motor Express is a more recent development, and the places where it has been organized are few. It is designed to cover a certain route, carry the farmer's produce to the market, and return to him things needed for carrying on his work. The Rural Motor Express differs from the Return Load Bureau in that it is generally a private venture, while the Return Load Bureaus are public institutions. Several of these express routes were interestingly described at the meeting; one operating out of Washington, D. C., with four trucks, and serving 16 farmers, and one from Wilkes-Barre, Pa., to New York City, which has regularly filed freight rates, bills of lading, etc., like a railroad. The great value of this institution is the time which is saved the farmers. It was estimated by C. T. Clayton, of the United States Department of Labor, that the Rural Motor Express, if developed throughout the country, would effect a labor saving of more than 100,000 men. Where the express has been developed, production has increased greatly. C. R. Wilson, of the food administration, stated that its effect upon the supply of food in Washington has been marked, and he estimated that within one year the District of Columbia and the surrounding country would be practically self-supporting.

There was a great deal of discussion at the meeting, as to whether it is more desirable to have many individual trucks in the return load work, than to have large companies organized to take care of the business. Some believed that the proper method of procedure is to encourage large concerns to take over certain routes and guarantee service. They argued that firms owning trucks would not care to go into the transportation business and risk having them loaded with undesirable freight, neither would they be willing to rely on the haphazard service of individual trucks. On the other hand, if responsible concerns would guarantee service, there would be no trouble in obtaining their coöperation. The other and more general opinion of the meeting seemed to be, that while the above argument is sound, in this present emergency every truck possible should be utilized and encouraged to supply the demand.

The opinions of the meeting, in regard to highways, were embodied in a resolution, which set forth the fact that with proper highways the transportation problem of the country would be solved, asserted that the rulings of various departments of the Government had greatly retarded new construction and maintenance and urged that the Council of National Defense promulgate a governmental policy of highway construction and maintenance which will permit the various states to proceed with their highway work on a sound basis.

Concrete Barges Wanted for New York Canal

Concrete barges are to be built as soon as possible for use on the New York State Barge Canal, which is now under the direction of the committee on inland waterways of the United States railroad administration. The committee, of which Gen. W. M. Black is chairman and Gen. C. Keller is secretary and executive director, has asked bids for the construction of 21 reinforced concrete barges, of approximately 500-ton carrying capacity each. Bids are to be received by the committee at its address, 601 G Street, N. W., Washington, D. C., up to 12 m., June 24.

Distinguished Service Cross for Three Engineer Officers

The new Distinguished Service Cross of the United States Government has been awarded to Capt. C. Raymond Hulsart, Lieut. Paul McLoud and Second Lieut. Donald MacIsaac of American railway engineer regiments, in recognition of their behavior in the fight on Nov. 30, southwest of Cambrai, when the American engineers assisted the British in withstanding a German attack.

Lieutenant Colonel of Engineers Gets Croix de Guerre

Lieut. Col. Thomas C. Clarke of the 110th Engineers, 35th Division, has been decorated with the French Croix de Guerre, according to a cable message received by his brother-in-law, Irving G. Knox, New York City. Before receiving his commission some months ago, Lieutenant Colonel Clarke was engaged in general engineering practice with offices at 111 Broadway, New York City. He is the son of the late Thomas Curtis Clarke, who was president of the American Society of Civil Engineers.

ENGINEERING SOCIETIES

Calendar

Annual Meetings

AMERICAN INSTITUTE OF CHEMICAL ENGINEERS; 129 York St., Brooklyn, N. Y.; June 19-22, Berlin, N. H.

SOCIETY FOR THE PROMOTION OF ENGINEERING EDUCATION; University of Pittsburgh; June 26-29, Northwestern University, Evanston, Ill.

AMERICAN CONCRETE INSTITUTE; 27 School St., Boston; June 27-29, Atlantic City, N. J.

AMERICAN SOCIETY FOR TESTING MATERIALS; University of Pennsylvania, Philadelphia; June 25-28, Atlantic City, N. J.

AMERICAN INSTITUTE OF ELECTRICAL ENGINEERS; 29 West 39th St., New York; June 26-28, Atlantic City, N. J.

The Western Society of Engineers discussed the coal situation in Illinois at the meeting held in Chicago, June 3. The meeting was addressed by F. C. Honnold, district representative of the United States fuel administration, and members of the coal conservation committee of the Illinois fuel administration.

The San Francisco Association of Members of the American Society of Civil Engineers held a joint meeting with the Pacific Railway Club on May 29, at which William C. Edes, chairman and chief engineer, Alaska Railroad Commission, gave an illustrated address on "Government Railroads in Alaska." Mr. Edes reviewed the progress of the work to date and described notable construction features.

The New England Water-Works Assn. and **the Boston Society of Civil Engineers** will hold a joint field day and excursion to Pemberton, Mass., June 19. The excursion will leave Boston from Rowe's Wharf at 10:15 a.m.

The Utah-Idaho Yellowstone Highway Assn. held its annual spring convention in St. Anthony, Idaho, May 27. About four hundred good roads enthusiasts, including many prominent public officials and road builders of Idaho and Utah, were present.

PERSONAL NOTES

A. R. ALLING, consulting engineer, Greenville, Miss., has become resident engineer, Arkansas-Louisiana Highway District, with headquarters at McGehee, Ark.

WILLIAM H. KIMBALL, consulting engineer, Davenport, Iowa, is now associated with the engineering division of the Bureau of Industrial Housing and Transportation, with headquarters at Washington, D. C.

DR. CHARLES R. MANN, of the Carnegie Foundation, received the degree of doctor of science from Lafayette College at the commencement exercises held last week at Easton, Pennsylvania.

J. WALDO SMITH, chief engineer of the Board of Water Supply, City of New York, received the degree of doctor of science from Columbia University at the 164th annual commencement.

MAJ. DAVID A. WATT, Engineer Reserve Corps, has been detailed from the office of the Chief of Engineers to take charge of the proposed dam at Muscle Shoals on the Tennessee River, succeeding Col. Hugh L. Cooper, who recently returned to France.

W. PARKER IRELAND has become engineer of building construction for the E. I. du Pont de Nemours Co., assigned to duty on the construction of the powder plant now being erected by the du Pont company near Nashville, Tenn.

GAYLORD CUMMIN, formerly city engineer, Dayton, Ohio, and who has resigned recently as city manager of Grand Rapids, Mich., has become assistant to the president, Kelsey-Brewer Co., public utility operators, Grand Rapids.

OBITUARY

Died in the Service of Their Country

LIEUT.-COL. BERTRAM T. CLAYTON, at one time assistant engineer of the Department of City Works and later assistant engineer in the Department of Finance of New York City, was recently killed by an enemy aerial bomb while serving with the American Expeditionary Forces in France. Colonel Clayton was well known in Brooklyn, where he organized Troop C and commanded the 14th Regiment, and also served as representative in Congress from the fourth district. At the beginning of the war, Colonel Clayton was placed in charge of the Army Transport Service in New York City, but at his request was transferred to duty overseas.

He was born in Alabama in 1862 and was the son of Maj.-Gen. H. D. Clayton of the Confederate Army. In 1882 he entered the United States Military Academy at West Point, from which he was graduated four years later and assigned to duty as second lieutenant in the Eleventh Infantry. In 1888 he resigned his commission to engage in the practice of civil engineering in Brooklyn, returning to military life two years later as first lieutenant and adjutant of the old Thirteenth Regiment of Brooklyn. He was made major and engineer officer of the Second Brigade in 1893, and two years later organized Troop C of Brooklyn, of which he was the first captain. Colonel Clayton saw active service with Troop C in Porto Rico during the Spanish-American War.

Upon his return from service in Porto Rico, Colonel Clayton was elected to Congress, but reëntered the military service two years later and served in the Philippines, Cuba and and Panama Canal Zone.

CAPT. CHARLES A. LINDERBERRY, county engineer of Whatcom County, Washington, with headquarters at Bellingham, died recently at Camp Lee, Va., of pneumonia. Captain Linderberry entered the service early in January and at the time of his death was with the 601st Regiment of Engineers. In 1916 he was elected engineer of Whatcom County, having held the same position from 1910-1914. During 1914-15 he was city engineer of Bellingham. Captain Linderberry had had previous military training and at one time was captain of Company M, Second Washington Infantry. He was a graduate of the engineering school, University of Washington.

E. H. SPALDING, district engineer for the Mesaba district, Duluth, Mesaba & Northern Ry., died at his home in Duluth May 28. Mr. Spalding spent the earlier part of his life in engineering work in foreign countries, going to Duluth from Mexico in 1893, previous to which he had been in Russia and South America. During his early residence in Duluth he was connected with his father, H. C. Spalding of the Minnesota Canal Co., which company was promoted to carry through a project to bring iron ore from the range by means of canals to be built in connection with rivers.

CLARENCE RUFUS NEHER, consulting engineer, Buffalo, N. Y., died recently in that city. Mr. Neher had been engaged in engineering work since 1880, first as a rodman with the Blossburg Coal Co., Blossburg, Penn. He was subsequently employed by the Ohio & Western R.R. and the Richmond & Danville R.R. In 1889 Mr. Neher was appointed division engineer of the Rochester division of the Western New York & Pennsylvania R.R., and in 1896 became resident engineer of the western division, New York State Department of Engineering, in charge of all canal and highway design and construction in that division. He had recently been identified with the construction of the new trolley line of the International Railway Co. between Buffalo and Niagara Falls, which has just been put in operation.

DAVID WEBSTER, consulting engineer and specialist in water works projects, Brantford, Ontario, died recently in that city.

GEORGE D. ROBERTSON, county engineer of Grays Harbor County, Washington, died at Montesano May 28. At the time of his death Mr. Robertson held a commission in the National Guard of the state of Washington as major of the Second Battalion, Third Infantry.

NEWS OF ENGINEERING INDUSTRIES

FOR MANUFACTURERS WHO SERVE ENGINEERS AND CONTRACTORS

New Government Agency Starts Lining Up War-Work Possibilities of Industries

Asks Chambers of Commerce to Propose Zone Directors—Cleveland Industries Already Organized

Letters have been sent out by Charles A. Otis, chief of the section of resources and conversion of the War Industries Board, looking to the organization of that agency, which was recently created to assemble data concerning industries now engaged in war work, or capable now or in the future of taking on more war work. The creation of such a section was noted in *Engineering News-Record* of last week, p. 1112. The letters were addressed to the presidents of the chambers of commerce of the principal cities in each of the 20 regions into which the section divides the country. Each chamber of commerce is asked to organize its respective region and suggest the names of three or four men suitable for appointment as regional director.

THE TWENTY REGIONS AS TENTATIVELY DEFINED—BOUNDARY LINES SUBJECT TO ADJUSTMENT

There will be in each region a representative appointed as the one who will be in contact with the chief of the section in Washington. He is to be preferably a local man, familiar with the conditions of the district he represents. He is in no way connected with the supply and purchasing agencies of the Government, except for the purpose of submitting information gathered in his district through the regional organization. "He must be willing," states the letter, "to give his services and assume responsibility for his region and be the personal point of contact"; he is to be "a prominent and forceful business man in whom the district has confidence."

Each regional organization is to develop "(1) existing sources of supply; (2) the necessity for the creation of new facilities; (3) the necessity for opening up new or additional sources of supply and (4) the expediency of converting existing facilities to new usage in order that the requirements may be fully met, and also in order that the existing facilities of organizations whose normal business may have been interrupted, curtailed or destroyed through war conditions may be utilized to the fullest extent possible."

In Cleveland and northern Ohio a survey of the kind proposed has been under way for some time, conducted voluntarily by the manufacturers of the district. Mr. Otis, recently president of the Cleveland Chamber of Commerce, is understood to have conceived the idea of such a survey, and prior to the formation of the section he was called to Washington by the War Industries Board to make a study of work of this nature. Because of the experience obtained at Cleveland, he gives an outline of what has been done there, and suggests that it be followed as far as possible. How the work is organized there is told on p. 1127.

The 20 men erroneously announced in last week's issue as the regional directors are the officers of the various chambers of commerce asked to help organize their regions.

Coal Shortage Shifts War Orders From East

Congestion and Certainty That Fuel Demand Will Exceed Supply Force Action—Economy Urged

No new orders for war materials will be placed in the East where it can be avoided, according to the recently announced decision of the War Industries Board and the fuel and railroad administrations. This action follows the announcement that an average weekly production of more than 12,000,000 tons of bituminous coal would be necessary to maintain the output required by the ever-increasing demand of the war machine, and to keep the country warm during the coal year which will end Apr. 1, 1919. It is stated that this amount exceeds the record production for any single week in the history of bituminous coal production, the nearest approach to it having been reached in the record week of May 25, when it was estimated to have reached the unprecedented figure of 11,811,000 net tons.

The estimated gross amount that will be required for the year mentioned is 634,594,000 net tons. This represents an increase of 79,866,000 net tons over the amount produced in 1917, which was 554,728,000 net tons, and this quantity represented a record of 50,000,000 tons greater than ever before in the history of the country.

Owing to the concentration of war plants in the New England and North Atlantic States, and to the fact that most of the bituminous mines are west of the Allegheny mountains, and the railways entering these sections are already taxed to the limit, measures have been taken in a joint meeting of the War Industries Board and the fuel and railroad administrations to restrict further the expansion of industries in these sections. The expansion of the "less essential" industries was stopped some time ago, but these measures will effect even the largest and most important, and have in view the diverting of the demand for fuel to those sections of the country not so heavily taxed, so as to insure as large a supply to domestic consumers as possible—a demand that is secondary in im-

portance only to actual war production. This, however, although affording some relief in certain parts of the country is entirely independent of production and does not lessen the necessity for utmost economy in all parts of the country.

It is asserted that the coal industry is unable to meet the situation, the car shortage adding to the seriousness of the problem. The utmost economy, especially in the industries not employed on war work, in power plants that use an amount of coal out of proportion to the power produced, and by domestic consumers is vital, and the saving of coal, in every possible way and by all of the people, is needed peremptorily. Should an actual deficit of even half a million tons occur it would mean a coal shortage bringing on personal privation and an industrial disaster of appalling magnitude, say men who have studied the situation.

The fuel administration is sending out engineers and inspectors to every one of the 250,000 steam producing plants, empowered to enforce improvement in both equipment and firing practice, as well as to organize shop committees in factories, even going to the length of personal instruction to engineers and firemen.

To Reclaim Injured Soldier for Industry

Put Men in Occupations Allied to Former Work Where Possible, Says Red Cross Director

To raise the maimed soldier from being a mere object of charity, into the status of a useful citizen, by making him a productive factor and a financial asset to his employer, is the substance of a brief recently received from the Red Cross. It is written by Douglas C. McMurtrie, director of the Red Cross Institute for Crippled and Disabled Men, New York City.

His suggestions are based on the successful experience of the European countries in vocational training, and his aim is the "restoring crippled men to the greatest possible degree and the sparing of the community the burden of unproductivity on the part of thousands of its best citizens."

Although most of the maimed soldiers will not be able to return to their former occupations their inability will not prohibit them from being trained for some other associated trades.

"The education of the adult is made up largely of his working experience," said Mr. McMurtrie. "The groundwork of training in his past occupation must under no circumstances be abandoned. The new trade must be related to the former one or be, perhaps, an extension or specialization of it. For example, a man who had done manual work in the building trades may by instruction in architectural drafting and the interpretation of plans be fitted for a foreman's job, in which the lack of an arm would not prove of serious handicap. A trainman who had lost a leg might wisely be prepared as a telegrapher, so that he could go back to railroad work, with the practice of which he is already familiar."

A dangerous situation will develop unless the erroneous impression is corrected, that now exists among business men and manufacturers, that they will be called upon, merely to "take care of" the soldiers from the standpoint of a patriotic sacrifice, in Mr. McMurtrie's belief. "Too many employers are ready to give the cripple alms, but are not willing to expend the thought necessary to place him in a suitable job," he asserted.

He states that the weakness of this method lies in the fact that a man who is given charity, or even a charity job, will sooner or later expect such assistance as a right and should a serious period of depression occur after the war, social unrest and discontent will be aggravated by large numbers of idle soldiers obsessed with that impression. The "will to work" when once destroyed by exposure to "sentimental sympathy of family and friends" is beyond restoration; hence, he urges immediate consideration of the problem. He says, further:

"This, then, constitutes the charge of patriotic duty upon the employer:

"To study the jobs under his jurisdiction to determine what ones might be satisfactorily held by cripples; to give the cripples preference for these jobs; to consider thoughtfully the applications of disabled men for employment, bearing in mind the importance of utilizing to as great an extent as possible labor which would otherwise be unproductive; to do the returned soldier the honor of offering him real employment, rather than proffering him the ignominy of a charity job."

He concludes by urging coöperation to accomplish this inspiring possibility.

Prompt Payment of Bills Brings Saving to Engineer Depot

The saving made by the finance division of the General Engineer Depot, U. S. A., through cash discounts on payment of bills within 10 days from date of invoices, amounted to $166,256.03 during the period Nov. 1, 1917, to May 1, 1918. Many of the discounts obtained were on materials of which the prices had been fixed.

Warren Brothers Win Oklahoma Highway Suit

Contracts for 55 miles of warrenite on a compressed stone base and 63 miles of additional grading were declared legal on May 30 by Judge Higgins of the Oklahoma district court in session at Okmulgee. This work was let in December, 1917, under a bond issue for $800,000. The point at issue was whether it was legal for the authorities to specify a patented pavement for the work.

Lime Manufacturers' Association to Hold Annual Meeting

The postponed annual meeting of the National Lime Manufacturers' Assn. will be held at the Hotel Statler, Cleveland, Ohio, June 19-20.

The organization of the Lime Association by the action of the manufacturers at this meeting will, it is asserted, be of prime importance. The first day will be largely devoted to this subject, as well as to the reading of several papers on lime production.

The second day will be given to an excursion to the Kelley Island Lime and Transport Co.'s Marblehead plant and the discussion of problems on the ground.

Assistant to War Secretary for Industrial Relations

An assistant to the Secretary of War to have charge of industrial relations has been appointed by Mr. Baker. He is Ernest M. Hopkins, president of Dartmouth College, from which he was graduated in 1901. He has been in charge of the industrial relations of the Quartermaster Department since 1917, prior to which he held similar posts in the Bell Telephone Co., the Curtis Publishing Co. and elsewhere.

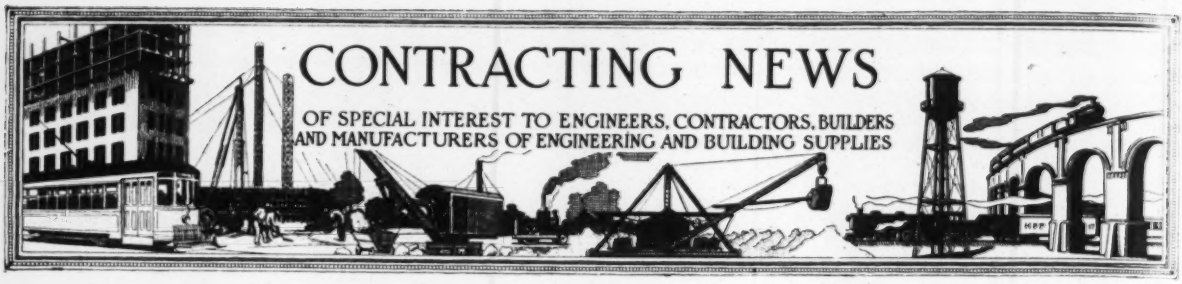
BUSINESS NOTES

M. C. Turpin, recently assistant to the publicity manager of the Westinghouse Co., East Pittsburgh, Penn., has resigned to become assistant manager of the technical publicity bureau of the Ordnance Department at Washington. Mr. Turpin had been with the Westinghouse Co. since 1909.

William W. Corlett has been appointed general solicitor of the United States Steel Corporation, succeeding the late Col. Raynal C. Bolling, who was killed in France in April. Mr. Corlett has been on the legal staff of the Steel Corporation since 1908.

"The Dravo Contracting Co., Engineering Works Department" is the name of the Neville Island plant of the Dravo Contracting Co., Pittsburgh. An entirely separate purchasing, accounting and engineering organization has been installed. J. D. Berg has been made vice-president of the Dravo Contracting Co., in charge of the engineering works department.

E. Francis McCrossin has found it necessary, on account of engineering duties, to withdraw from the firm of McCrossin & Darrah, representing the Link-Belt Co. in Alabama. John F. Darrah will hereafter be the sole representative of the Link-Belt Co. in the territory, with offices at 751 Brown-Marx Building, Birmingham.


CONTRACTING NEWS
OF SPECIAL INTEREST TO ENGINEERS, CONTRACTORS, BUILDERS
AND MANUFACTURERS OF ENGINEERING AND BUILDING SUPPLIES

Proposals

For Proposals Advertised See Pages 49-54 Inclusive

WATER-WORKS

Bids Close		See Eng. News-Record
June 17	Hamilton, Ont.	June 13
June 17	Miller, S. D.	June 13
June 19	Chicago, Ill.	June 13
June 20	Galveston, Tex.	May 23
June 22	Abilene, Tex. Adv. May 23.	May 23
June 24	Scobey, Mont.	May 30
June 25	Watervliet, N. Y. Adv. June 6 and 13.	June 13
June 27	Ossining, N. Y. Adv. June 6 and 13.	June 6
June 28	Newcastle, Wyo.	June 13

SEWERS

June 17	Central Falls, R. I.	June 6
June 17	Elmhurst, Ill.	June 6
June 18	Boston, Mass.	June 13
June 18	Sheffield, Ala.	June 13
June 19	Huntington, W. Va.	June 13
June 20	Morton Grove, Ill.	June 13
June 20	Chicago, Ill.	May 30
June 22	West Allis, Wis.	June 6
June 24	Scobey, Mont.	May 30
June 26	Junction City, Kan.	June 13
June 27	Ossining, N. Y. Adv. June 6 and 13.	June 6
July 10	Bridgeport, Conn. Adv. June 13.	June 13

BRIDGES

June 14	Chittenango, N. Y.	June 6
June 20	Cheyenne, Okla.	June 13
June 24	Pensacola, Fla.	June 13
June 24	Nile, Wash.	June 6
June 27	Harrisburg, Pa.	June 13
June 29	Charleston, W. Va.	June 6
July 31	Santa Domingo Adv. May 16.	May 16

STREETS AND ROADS

June 17	Central Falls, R. I.	June 6
June 17	Muskegon, Mich. Adv. June 6.	June 6
June 17	Mayville, N. D.	June 13
June 17	New Haven, Conn.	June 13
June 17	Chicago, Ill.	June 13
June 17	Albany, N. Y.	June 13
June 18	Miami Beach, Fla. Adv. June 13.	June 13
June 18	Portland, Ore.	May 30
June 18	Pittsburgh, Pa.	June 6
June 18	Massachusets	June 13
June 18	Boston, Mass.	June 13
June 19	Preston, Minn.	June 6
June 19	Chicago, Ill.	June 13
June 20	Tulare, Cal.	June 13
June 20	Indiana	May 30
June 20	Somerset, Pa.	June 6
June 22	Tombstone, Ariz.	June 6
June 22	Bisbee, Ariz.	June 13
June 24	Rockford, Ala.	May 30
June 24	Tennessee Adv. June 6.	June 6
June 24	Minneapolis, Minn.	June 13
June 24	Everet, Wash.	June 13
June 24	California	June 13
June 25	Ripley, W. Va.	June 6
June 25	Seattle, Wash.	June 13
June 25	Jersey City, N. J.	June 13
June 25	Tennessee Adv. June 6.	June 6
June 27	McCormick, S. C.	June 13
June 28	Point Pleasant, W. Va.	June 6
June 28	Topeka, Kan.	June 13
June 29	Hamilton, O.	June 13
June 31	Oswego, Kan.	May 16
July 1	Chicago, Ill.	June 6
July 2	Pennsylvania	June 13
July 3	Cleburne, Tex.	June 13
July 8	Liberty, Tex.	June 13
July 8	Chaska, Minn.	June 13
July 9	Sharon, Pa.	June 13
July 9	Sharon	June 6
Aug. 1	Cleveland, O.	Mar. 28

EXCAVATION AND DREDGING

June 17	Jackson, Tenn.	June 6
June 18	Albany, N. Y.	May 30
June 18	Hannibal, Mo.	June 13
June 20	Council Bluffs, Ia.	June 13
June 20	New Jersey.	June 13
June 20	Storm Lake, Ia.	June 13
June 21	Lesueur Center, Minn.	June 13
June 22	Winamac, Ind.	June 13
June 26	Shreveport, La.	June 6
June 26	Glenwood, Ia.	June 13
June 27	Dakota City, Ia.	June 13
June 28	Slayton, Minn.	June 13
June 28	Worthington, Minn.	June 13
July 2	Greenville, Miss.	June 6

INDUSTRIAL WORKS

June 20	South Boston (Boston P. O. Mass.	June 13
June 28	Newark, N. Y. Adv. June 6.	June 6
June 30	Sioux City, Ia.	June 6
July 1	Chicago, Ill.	June 13

BUILDINGS

June 14	Philmont, N. Y.	May 30
June 15	Baldwin, Fla.	May 30
June 15	Bellefontaine, O.	May 30
June 15	Cleveland, O.	June 13
June 17	Brooklyn, N. Y.	June 13
June 18	Zanesville, O.	May 30
June 18	Rutland, Mass.	June 6
June 18	New Britain, Conn.	June 6
June 18	Whitesboro, N. Y.	June 6
June 20	Bottineau, N. D.	June 13
June 20	Chicago, Ill.	June 13
June 21	Boyles, Ala.	June 13
June 24	Phoenix, Ariz.	June 13
June 25	Austin, Tex.	June 6
June 25	Wichita Falls, Tex.	June 13
June 26	Lansing, Mich.	June 6
June 27	Ossining, N. Y. Adv. June 6 and 13.	June 6
June 28	Centralia, Wash.	June 6
June 30	Fargo, N. D.	June 13
July 1	Chicago, Ill.	May 23
July 1	Sioux Falls, S. D.	June 13
July 9	Manhattan, Kan.	June 13

FEDERAL GOVERNMENT WORK

June 14	Motors, Generators, etc — Washington, D. C.	June 13
June 17	Commandant's Quarters, etc. —San Diego, Cal.	May 16
June 17	Sprinkler System—Brooklyn, N. Y.	May 23
June 17	Wharf and Trestle—Charleston, S. C.	May 23
June 17	Storage Sheds—Spec. 3051 —Washington, D. C.	June 6
June 17	Ammunition Filling Houses —Spec. No. 3006—Ft. Mifflin, Pa.	May 30
June 17	Core Ovens—Spec. No. 3036 —Washington, D. C. Adv. May 23.	May 30
June 17	Alterations and Additions—Spec. 3048—Great Lakes, Ill.	June 6
June 17	Chronometer and Time Station—Spec. 3071—Mare Island, Cal. (Vallejo, P. O.)	June 6
June 17	Building — Spec. 3095 — Washington, D. C.	June 13
June 17	Storehouse, Shops, Etc.— Spec. 294—Cape May, N. J.	June 13
June 17	Cranes—Spec. 3028—Brooklyn, N. Y.	June 13
June 17	Magazine Buildings—Spec. 2927 — Lake Denmark, N. J.	June 13
June 20	Levee Work—St. Louis, Mo. Adv. May 23.	May 23
June 20	Mattress and Dike Construction—Pine Bluff, Ark. Adv. May 23.	May 23
June 21	Engines, Compressors, etc.— New Orleans, La. Adv. June 13.	June 13
June 24	Fire Protection and Water Systems—Spec. 2970—Lake Denmark, N. J.	June 6
June 24	Removing Radio Tower—Spec. 3073—Cordova, Alaska	June 6
June 24	Buildings, Pavement, etc. —Spec. 3044—San Diego, Cal.	June 6
June 24	Emergency Hospital—Spec. 3070—Norfolk, Va.	June 6
June 24	Fire Protection System—Spec. 2970—Lake Denmark N. J.	June 6
June 24	Water Works—Spec. 2970—Great Lakes, Ill.	June 13
June 24	Buildings — Spec. 3078 — Washington, D. C.	June 13

Streets and Roads (Continued)

Alley between Fillmore, Grenshaw, Spaulding and Homan St., 338 cu.yd. grading, 1220 sq.yd. 7 in. concrete pavement, $2900.

Alley between Flournoy, Lexington, Sacramento and Albany Sts., 274 cu.yd. 7 in. concrete pavement, $2205.

Alley between Polk, Arthington, Independence and Springfield St., 280 cu.yd. grading, 800 sq.yd. 7 in. concrete pavement, $1800.

Alley between Fillmore, 12th, Whipple and Albany Sts., 282 cu.yd. grading, 1220 sq.yd. 7 in concrete pavement, $2600.

Alley between Fillmore, 12th, Albany and Troy Sts., 638 cu.yd. grading, 1220 sq.yd. 7 in. concrete pavement, $3200.

Alley between Fillmore, Grenshaw, Crawford and Springfield Sts., 125 cu.yd. grading, 1250 sq.yd. 7 in. concrete pavement, $2375.

South Hermitage Ave., from West 47th to West 51st St., 4920 ft. concrete curb and gutter, 2700 cu.yd. grading, 10,060 sq.yd. asphalt pavement on 6 in. concrete base, 12 catch basins, $30,124.

Kingston Ave., from East 79th St. to Baltimore & Ohio R. R. right of way, 1870 ft. concrete curb and gutter, 2200 cu.yd. filling, 2980 sq.yd. asphalt pavement on 6 in. concrete base, 2 catch basins, $10,789.

Thomas St. from West Grand Ave. to Chicago & Northwestern R. R. right of way, 14,000 ft. concrete curb and gutter, 11,000 cu.yd. grading, 800 ft. 10 in. sewer tile, 51 catch basins, 10 manholes, 21,600 sq.yd. asphalt pavement on 6 in. concrete, $73,553. Total cost, $154,587. C. E. Hill, 207 City Hall, city engr.

Ill., Robinson—City soon lets contract paving North Jefferson St., involving 3600 sq.yd. concrete pavement 20 ft. wide, 3000 lin.ft. curb, grading, drainage system, etc. J. P. Lyon, city engr.

Wisconsin—State Highway Comn., Madison, soon lets contract building Endeavor-Fackwaukee Rd., Marquette Co., Federal Aid Project No. 25. Work involves 19,940 cu. yd. excav., 6595 cu. yd. concrete Class "A," 36,413 sq. yd. gravel surfacing, 4.05 acres clearing and grubbing, etc. T. F. Mengal, Grand Rapids, div. engr.

Wisconsin—State Highway Comn., Madison, plans to build 1.8 mi., Lancaster-Platteville Highway, Ellenboro Twp., Grant Co., project No. 41. Work involves 183 cu. yd. rock and 9689 cu. yd. earth excav., 1294.2 sq. yd. concrete surfacing, 16 ft. wide, 98.2 cu. yd. concrete in culverts, rip rap, pipe, etc.; also one 70 ft. riveted truss, steel span bridge on same road, 20 ft. roadway and concrete floor. About $131,700.

Wis., Ashland—Bd. Pub. Wks. rejected bids received paving 2000 yds. 2nd St. Project abandoned for this year. Noted June 6.

Wis., Oshkosh—Winnebago Co. Highway Comrs. soon let contract for 1 mi. Oshkosh Neenah Rd., concrete, 16 ft. wide and 1 mi. Oshkosh Waupun Rd., concrete, 9 ft. wide. Project includes building culverts.

Wyoming—State Highway Comn., Cheyenne, soon lets contract building 6.23 mi. Cokeville Star Valley Rd. and 4 mi. Ft. Bridger Erie Rd. E. Sevison, secy.

Mont., Butte—Silver Bow Co., plans to improve all bridges and roads in Glacier National Park. About $80,000 appropriated for project.

Mont., Harlowton—Wheatland Co. will sell $95,000 bonds to build highways and bridges. W. W. Phares, co. clk. Noted Apr. 4.

Mo., Independence—Jackson Co. Comrs. soon lets contract grading and macadamizing Kentucky-Roberts Rd. Work involves 1750 yd. earth excav., 3600 yd. macadam, 52 yd. concrete. O. C. Sheley, co. engr.

Tex., Austin—Attorney General's Dept., approved $75,000 bond issue for road work in Rd. Dist. No. 10, Travis Co.

Tex., Cuero—DeWitt Co. election July 16, to vote on $40,000 bonds to build roads.

Okla., Pauls Valley—Garvin Co. voted $190,000 bonds to improve roads in Walker Elmore and Brady Twps.

Colo., Boulder—Comrs. Boulder Co. plan to improve South Fork Rd. About $50,000.

Colo., Denver—City plans to surface with smelter slag, sand, gravel and loam, also build concrete curbs and gutters where necessary on streets in North Denver Surfacing Dist. No. 3. About $27,476. J. O. Hunter,. city engr.

Ariz., Tucson—Pima Co., election Sept. 20, to vote on $125,000 bonds to build and improve highways.

Wash., Seattle—Bd. Pub. Wks. receives bids about July 25, paving walks on both sides of 13th Ave., W., et al., 5 mi. long, 6 ft. wide, involving 36,000 sq.yd. concrete pavement, 11,325 cu.yd. excav., cost, $77,735; building Duwamish Sanitary Fill, Duwamish Valley, involving placing of 648,350 cu.yd. earth, cost, $76,781. V. H. Dimock, city engr. Noted Mar. 14.

Wash., Spokane—City plans to pave 14th Ave. from Lincoln to Adams Sts., $13,000; Sund Ave. from Stevens to Wall Sts., $4200. A. H. Dimock, city engr.

Wash., Stevenson—L. I. Hewes, engr., Skamania Co., received no bids, June 8, grading and draining 4.47 mi. Cook-Collins National Forest Rd., 20 ft. wide, Columbia Natl. Forest. Noted May 30.

Cal., Eureka—Humboldt Co. rejected bids building 10½ mi. Bull Creek Lattole Rd. About $57,350. Bids in excess of appropriation.

Cal., San Jose—Santa Clara Co. soon lets contract building and repairing 3 mi. Coyote Rd. and 3 mi. Almaden Rd., Supervs. Dist. No. 2. Noted Feb. 28.

Ont., Ottawa—City plans to build 50 mi. of Gouin Blvd. from here to Gatineau Hills. About $300,000.

BIDS DESIRED

Mass., Boston—Until July 2, by Pub. Wks. Dept., City Hall, paving B'way. between Washington St. and New York, New Haven & Hartford R. R. bridge, 1920 sq.yd. long, granite block with grout joints, also 220 sq.yd. asphalt joints and 8000 ft. artificial sidewalks. About $16,000.

N. Y., Brooklyn—Until July 3 by E. Riegelman, boro. pres., regulating and paving with asphalt on present concrete foundation 45th St. from 2nd to 3rd Aves. and 26th St. from 3rd to 4th Aves.

N. Y., New York—Until July 8, by F. L. Dowling, boro. pres., regulating and repaving with granite block pavement on concrete foundation Front St. from Coenties Slip to old slip, Duane St. from Elm St. to Bway., Worth St. from Church to Hudson Sts., westerly roadway of 2nd Ave. from 59th to 60th Sts.; with sheet asphalt on concrete foundation Bway. from 169th to 181st Sts.

N. Y., New York—Until July 2, by H. Bruckner, boro. pres., (Bronx Boro.), repaving with sheet asphalt on concrete foundation East 188th St. from Creston Ave. to Grand Blvd. and Concourse and setting curb where necessary, regulating, grading, setting curb, laying sidewalks and crosswalks, building inlets, receiving basins, etc., and paving with bituminous concrete on cement concrete foundation West 190th St. from University to Webb Aves.

N. Y., St. George, S. I.—Until July 2, by C. D. Van Name, boro. pres., (Richmond Boro.), regulating and repaving with granite block pavement on concrete foundation and with bituminous macadam on width of about 10 ft. south of southerly rail of railroad tracks, Richmond Terrace between Western Ave. and Elizabethport Ferry.

New Jersey—Until July 10, by State Highway Comn., Broad St., Bank Bldg., Trenton, improving State Highway Route No. 4, Sect. No. 1, between Red Bank and Middletown, Monmouth Co., with Portland cement concrete surface. Work involves 37,000 sq. yd. surface pavement. A. L. Grover, ch. clk.; advertised in this issue.

Pennsylvania—Until July 11, by J. D. O'Neil, comr. State Highway, building roads in following counties:

Washington Co., grading and draining 3310 ft. State Highway Route 268, 33 ft. wide, Allen Twp.

Greene Co., 18,083 ft. State Highway Route No. 268, 1 course plain cement concrete pavement and hillside vitr. block on concrete foundation, Morgan and Franklin Twps.

Mercer Co., 13,881 ft. State Highway Route 73, 1 course plain cement concrete pavement, 16 ft. wide, Pine Twp.

Erie Co., 15,918 ft. State Highway Route 84, 1 course plain cement concrete pavement or bituminous concrete on concrete foundation, Mill Creek and Summit Twps.

Chester Co., 17,049 ft. State Highway Route 134, 1 course plain cement concrete pavement, 16 ft. wide, Pocopson Twp.

2334 ft. State Highway Route 131, either 1 course plain cement concrete pavement or bituminous concrete and hillside vitr. block on concrete foundation, Kellett Square Boro.

Cambria Co., 4983 ft. State Highway Route 276, either vitr. block pavement on concrete base or 1 course plain cement concrete pavement, 16 ft. wide, Croyle Twp.

Blair Co., 1269 ft. State Highway Route 260, 1 course plain cement concrete pavement, 30½ ft. wide, Hollidaysburg Boro.

Clarion Co., 1842 ft. State Highway Route 65, vitr. block pavement 16 and 35 ft. wide.

W. Va., Williamson—Until July 8, by Mingo Co., building 2 mi. road between Matewan and New Howard Colliery Co. on Tug River. E. Boggs, co. clk. Noted Apr. 4.

O., Akron—Until July 5, by Summit Co., improving 2½ mi. North Springfield Rd., 16 ft. wide, either rein.-con., 7 in. thick, bituminous concrete on 6 in. base with 2 in. wearing surface or brick on 6 in. base and concrete curbing, involving 22,600 sq.yd. pavement and 24,000 cu.yd. grading; 1.72 mi. Sect. 4A, Arlington Greensburg Rd., 16 ft. wide, either rein.-con. 7 in. thick; bituminous concrete, on 6 in. base with 2 in. wearing surface or brick block on 4 in. base and concrete curbing, involving 16,200 sq.yd. pavement. C. Castigan, co. surv. Noted Apr. 18.

Ill., Chicago—Until July 1, by Bd. Local Impvts., for Michigan Ave. improvements bridge superstructure, electric power equipment, plaza substructure and superstructure., north and south bridge approaches, lighting equipment. No bids received June 17. About $2,000,000. C. H. Hill, city engr. Noted June 13.

Kan., Kansas City—Until July 15, by Comrs. Wyandotte Co., building 1.6 Southwest Blvd., west of Rosedale, water bound macadam. O. K. Williamson, co. engr. Noted June 6.

Neb., Omaha—Until July 2, by city, paving and curbing Brown St., from 25th Ave. to 30th St., 1900 ft. long, 24 ft. wide, cost, $14,000; Military Ave. from 48th to 52nd St., 3200 ft. long, 40 ft. wide, cost, $35,000. Bids will be received on all classes of material. J. A. Bruce, city engr.

N. D., Bowman—Until July 8, by Bowman Co., building 17.7 mi. road, involving 20,520 cu.yd. excav., 20,050 cu.yd. station overhaul, etc. F. R. Huff, co. aud.

N. D., Harvey—Until July 11, by Wells Co., (Fessenden) building 18 mi. road in Harvey, involving 29,862 cu.yd. turnpiking, 27,799 cu.yd. excav., 14,470 cu.yd. station overhaul, etc. H. Hardin, co. aud.

Mont., Libby—Until July 12, by Dept. Pub. Rds., Portland, Ore., clearing, grading and building bridges on Highway in Yook Valley, Lincoln Co., Kootenai National Forest, 10.1 mi. long, 12 ft. wide. About $65,000. Work involves 3668 cu. yd. rock, 24,404 cu. yd. excav., 85 cu. yd. masonry wall, 16 log bridges from 6-60 ft. span, 16 ft. wide, etc. L. I. Hewes, Portland, dist. engr. Noted May 23.

Mont., White Sulphur Springs—Until July 12, at Office Pub. Rds., Portland, Ore., clearing, grading and bridging 5 mi. Jefferson National Forest Rd., Sheep Creek, Sect. 1. Project involves 34,250 cu. yd. excav., 1610 cu. yd. overhaul, 796 lin. ft. culverts, etc. L. I. Hewes, dist. engr.

Colo., Grand Junction—Until July 2, by C. S. Jones, clk., Mes Co., building 2½ mi. Swede Flat Meadows Rd.

New Mexico—Until Aug. 15, by State Highway Comn., Capitol Bldg., Santa Fe, building 3 mi. State Rd. No. 3 Sect. No. 2, Quay Co. between San Jon and Tucumcari. Work involves 10,031 cu. yd. clay, loam and sand, 701 cu. yd. loose shale, 4889 cu. yd. gravel surfacing, 100,821 yd. stations overhaul, 190 lin. ft. 18-36 in. corrugated iron pipe, etc. J. A. French, engr.; advertised in this issue.

Idaho, Grangeville—Until June 29, by Cottonwood Highway Dist., paving and macadamizing 4.25 mi. road in Cottonwood Highway Dist. Work involves 27,000 cu.yd. excav. and 39,629 sq.yd. macadam.

Streets and Roads (Continued)

Washington—Until July 8, by State Highway Comn., Olympia, grading and paving with 1 course concrete 6.3 mi. road between Lacey and Nisqually, Thurston Co. Work involves 73,000 sq.yd. concrete and 12,000 cu.yd. grading. J. Allen, highway comr.

Ore., Canyon City—Until July 3, by Grant Co., grading, draining and macadamizing about 5 mi. road in several sections between John Day and prairie on John Day Highway.

California—Until July 8, by State Highway Comn., Sacramento, building 8.4 mi. concrete road in Alameda Co., between Overackers Corner and southern boundary; 10.2 mi. concrete road in Monterey Co. between southerly boundry and point 3 mi. northwesterly from Bradley; 12 mi. gravel surfaced road, 15 ft. wide in Tehama Co. between Red Bluff and northerly boundary.

PRICES AND CONTRACTS AWARDED

(★Indicates award of contract)

Massachusetts—State Highway Comn., Boston, received low bids building 3500 ft. Newburyport Highway, 18 ft. wide, in Newburyport Twp., from J. E. Watkins, Amesbury, $21,689; T. A. Monnahan, Hamilton, $23,486; C. J. Sweeney, Newburyport, $23,771. Noted June 13.

Mass., Boston—Bd. Pub. Wks. received low bid paving Congress St. and Dorchester Ave. granite block on concrete base, from J. Doherty, 133 Calumet St., Roxbury, $41,903. Noted June 13.

Mass., Boston—City received low bids, June 19, paving Congress St. from Atlantic Ave. to Fort Point Channel and Dorchester Ave. from Congress to Summer Sts., new granite blocks with grouted joints on concrete base, from J. Doherty, $41 904; J. E. Quinn, 816 A. O. S. Bldg., $42,335; B. E. Grant, 27 School St., $43,291. Contractors all of Boston. Noted June 6.

★**Mass., Boston**—Dept. Pub. Wks. will resurface Blue Hill Ave. from Georgia to Seaver Sts., $4300; Columbus Ave. from Centre to Washington Sts., $5000; Columbus Ave. from Washington St. to Walnut Ave., $4300; macadam and blanket coat with tar binder. Work will be done by day labor.

★**Mass., Boston**—Bd. Pub. Wks. let contract paving Dartmouth St. from Tremont to Stuart Sts., and Dorchester Ave. from Freeport to Park Sts., granite blocks, to J. Doherty, Boston, $38,376 and $26,577 respectively; Park St. from Tremont to Beacon Sts., filbertine, Warren Bros., 142 Berkeley St., $14,674; Washington St. between Forest Hills and Archdale Rd., granite block, concrete foundation, Simpson Bros. Corp., 166 Devonshire St., $74,222. Noted June 20.

N. Y., Albany—Bd. Contr. & Supply, received low bids improving Northern Blvd. from North Pearl St. to Rensselaer Ave. from P. W. Muldeny, $20,223; M. F. Dallard, Manning Blk., $41,022. Noted June 13.

★**N. J., Freehold**—Monmouth Co. let contract building 2 mi. Marlboro Freehold Rd., rein.-con. Sect. 1, to Fireproof Realty & Construction Co., 55 Magnolia Ave., Jersey City, $64,839.

★**N. J., Hackensack**—Town let contract laying 12,730 sq. yd. asphalt, concrete surfacing on macadam foundation on Main St. and Winant Ave., to M. J. O'Connell, 135 Union St., cost plus percentage.

Pa., Plymouth—Boro. let contract grading, repaving and resetting curb on West Main St., to E. Quinn, West Main St. About $10,000.

★**Pa., Sewickly**—City let contract improving Broad St., to McPherson Bros., 421 Chestnut St. About $14,567; cost plus percentage. Noted June 13.

★**Pa., South Brownsville**—Boro. let contract grading, paving and curbing 2nd St., from end of present pavement near Joners St., to Washington St.; Arch St., from Water to 2nd Sts.; Pearl St. from Angle to Wall Sts.; Green St. from Clover to Broad Sts., Broad St. from Green Hill to High Sts., involving 11,500 sq.yd. vitr. block, 3710 lin.ft. curb, 3565 lin.ft. rough curbing and 9550 cu.yd. excav., to Petrilla Bros., South Brownsville, $81,356. Noted June 6.

★**S. C., Charleston**—Sanitary Drainage Comn., Charleston Co., let contract paving 3500 ft. Meeting St. from city limits, 20 ft. wide, concrete, to Simons Mayrant, Peoples Bldg., $3.29 per sq.yd. Work involves 7700 sq.yd. 7 in. 1 course concrete, 1954 sq.yd. Belgian block and 3 mi. haul. Noted June 6.

★**Fla., Lake Alfred**—City let contract improving street, involving 65,000 sq.yd. asphalt concrete pavement, 65,000 sq.yd. clay paving, 48,000 cu.yd. excav., concrete curb and gutter, etc., to McDonald Constr. Co., Lakeland, $34,668. Noted Mar. 28.

★**Ala., Florence**—Comrs. Lauderdale Co. let contract extending Huntsville Rd. from Killen through Center Star to connect Florence with Dam 2, to Newell Bros., Birmingham. About $30,000. Noted May 23.

★**Ala., Montgomery**—Montgomery Co. will grade 3 mi. Hayneville Rd. by day labor. Noted June 6.

★**Miss., Yazoo**—Comrs. Yazoo Co. let contract grading and graveling 13.75 mi. road in Dist. No. 5, to Healy Constr. Co., Meridian.

★**Ohio**—State Highway Comn., Columbus, let contract building roads in various counties as follows:

Butler Co., Sect. "A-1," Eaton-Middletown Rd., grading and paving with brick, 1.40 mi., Bigler Bros., Middletown, $33,685.

Fayette Co., Sect. "O," Hillsboro-Washington C. H. Rd., grading and paving with waterbound macadam, 2.23 mi., Mark & Van Gundy, Washington C. H., $24,329.

Highland Co., Sect. "K," Hillsboro-Piketon Rd., grading and paving with waterbound macadam, 2.40 mi., Bean & Co., Highland, $26,395.

Montgomery Co., Sect., "O," Dayton-Indianapolis Rd., grading and paving with rein.-con., 2.04 mi., Clifton Hoolehan Dayton, $57,630.

Sect. "R," Dayton-Troy Rd., grading and paving with concrete, 1 mi., Ed. Ryan, Springfield, $27,593.

Sect. "P," Dayton-Greenville Rd., grading and paving with plain concrete, 3.27 mi., D. A. Onkst & Son, Dayton, $83,542.

Sect. "A-1," Dayton-Lebanon Rd., grading and paving with concrete, 1.77 mi., John Wroe, Dayton, $45,546.

Sandusky Co., Sect. "L-2," Fremont-Bellvue Rd., grading and paving with brick, 3.97 mi., Modern Constr. Co., Fremont, $184,038.

Fairfield Co., Sect. "G-1," Lancaster-New Lexington Rd., grading and paving with brick, .0625 mi., O. M. Junk, Chillicothe, $43,333. Noted June 6.

★**O., Cleveland**—City let contract grading, draining, curbing, paving and repaving Hough Ave. from East 55th St. to East 66th St., to Reiley Bros., 348 The Arcade, $29,405; West 48th St. from Clark Ave. to point 535 ft. north, to Roehl Bros., Clark and West 25th Sts., $8401; East 130th St. from Woodland Ave. to Shaker Blvd., to Baldwin Bros. Co., Rose Bldg., $15,183.

★**Ill., Waukegan**—Lake Co. let contract to Eclipse Constr. Co., Winnetka, building Sect. 1, Sheridan Rd., Federal Aid, from Waukegan to Zion City, 18,990 ft. long, 18 ft. wide, concrete, with 6 ft. shoulders, involving 11,400 cu.yd. grading, 37,980 sq.yd. 7 in. concrete, and 22,000 sq.yd. old salvaged macadamized shoulders, $59,744; Sect. 2, Sheridan Rd. from Zion City to Illinois-Wisconsin state line, Federal Aid, 13,133 ft. long, 18 ft. wide, concrete, with 6 ft. macadamized shoulders, involving 6540 cu.yd. grading, 17,520 sq.yd. old salvaged shoulders, 26,270 sq.yd. concrete, $37,944. Noted June 20.

Ill., Waukegan—City received low bids paving Market St., from C. P. Moran, Waukegan, $37,237; J. Cape & Sons, 468 Water St., Racine, Wis., $38,197; R. R. Birdsall Constr. Co., Racine, Wis., $38,798.

★**Ia., Marshalltown**—Marshall Co. let contract grading 4 mi. Lincoln highway and streets in State Center, to P. E. Shugart, Nevada; 6 mi. Lincoln highway, to T. Ryan & Son, Loveland.

★**Kan., Ft. Scott**—City let contract paving Wall St. from Wilson to Hill Sts., 4 in. vitr. fiber brick, to Thogmartin & Gardiner, Ft. Scott.

★**N. D., Carrington**—Foster Co., let contract grading 16 mi. road, to Stanley Bros., St. Paul. About $18,000. Noted Mar. 21.

★**Mont., Shelby**—City let contract building sidewalks, curbs and gutters, to Two Miracle Concrete Co., Shelby. About $10,525.

★**Mont., Superior**—Mineral Co. let contract building 4.1 mi. highway west of Alberton, 19 ft. wide, to Rajotte, Fobert & Winters, Zeigler Bldg., Spokane, Wash., $65,025. Work involves 30,000 cu. yd. grading and 12,800 cu. yd. rock. Noted May 30.

★**Mo., Independence**—Jackson Co. let contract grading and macadamizing portion Sterling Douglas Rd. from Columbus to Rock Creek, to Davidson Bros., Kansas City, $14,615. Work involves 35,000 cu. yd. earth excav., 200 cu. yd. concrete, 3500 sq. yd. macadam and 260 ft. 12 and 24 in. concrete pipe. Noted May 30.

Mo., Independence—Comrs. Jackson Co., received low bids grading and macadamizing 3¼ mi. Frank Frick Rd. from, Kansas Constr. Co., Armour Blvd. and Locust St., Kansas City, Mo., $15,640; C. Gidinsky, 3419 Kenwood, Kansas City, Mo., $18,021; construction of Tripplett Bridge from, P. A. Hartung, 37th and Highland, Kansas City, Mo., $7,593; W. Phillips, Butler, Mo., $7,648.

★**Tex., Georgetown**—Williamson Co. let contract building roads and bridges, to H. Brown, Temple. Noted May 23.

★**Tex., Houston**—Harris Co. let contract placing bituminous top on Humble River Rd., to Finley Method Co., 703 Stewart Bldg. About $10,075.

★**Okla., Coalgate**—Coal Co. let contract building 16¼ mi. road to C. G. Landon, 225½ West Grand St., Oklahoma. Noted May 27.

Wash., Auburn—City received low bid paving East 1st St., 1 course concrete, 24 ft. wide, from Kaiser Paving Co., Everett, $12,014.

★**Wash., Seattle**—Bd. Pub. Wks. let contract paving ¾ mi. Howard Ave., N., et al., 30 ft. wide, concrete, to V. Bressi, 852 Rainier Ave., $29,078. Work involves 4400 lin.ft. concrete curb and 7800 sq.yd. 6 in. concrete pavement. Noted May 30.

★**Wash., Vancouver**—Comrs. Clarke Co. let contract building and macadamizing 1 mi. Permanent Highway, from Camas to Fishers, to O. D. Wolf, Washougal, $32,780. Work involves 18,385 cu.yd. grading and 12,320 cu.yd. crushed rock surfacing. Noted May 23.

★**Wash., Whitman**—Colfax Co. let contract grading, draining and surfacing with crushed rock, Spring Flat Four Mile Rd.; Improved Rd. No. 2, 8 mi. long x 16 ft. wide, to Mitchell Bros., Paulsen Bldg., Spokane, $75,406. Work involves 47,000 cu.yd. grading and 75,100 cu.yd. macadam. Contract conditional upon approval of Bond Issues Com. Noted May 16.

★**Ore., Portland**—Multnomah Co. let contract building Derby St. approach to Interstate bridge, wearing surface on crushed rock base, 5900 ft. long, 24 ft. wide, to Warren Constr. Co., Journal Bldg., $27,152. Work involves 15,133.3 sq.yd. bituminous and 2500 cu.yd. rock. Noted June 20.

Ore., Portland—City received only bid grading and paving Willamette Blvd., 3252 ft. long, with 20 ft. central strip, gravel bitulithic, from Warren Constr. Co., Journal Bldg., $22,035. Work involves 1504 cu.yd. grading, 7640 sq.yd. gravel bitulithic, 2153 ft. concrete curbing and 1198 sq.ft. concrete sidewalk, 3½ in. thick.

Streets and Roads (Continued)

★**Cal., Los Angeles**—City let contract grading and oiling Fountain Ave. between Sanborn and Bates Aves. and portions of other streets in Fountain and Myra Aves. Impvt. Dist., to W. Liddington, 420 East 60th St. About $11,621. Work involves 55,732 sq.ft. rough grading, 55,732 sq.ft. finishing grade, oiling and rolling; 3772 lin.ft. cement curb; 19,660 sq.ft. cement sidewalk; 8681 sq.ft. concrete gutter; rein.-con. culvert, etc.

Cal., San Bernardino—Bd. Superv. San Bernardino Co. received lowest bids building concrete pavement and storm drain in Hellman Ave. near Cucamonga, from Johnson, Shea Co., Riverside, $95,710. Noted Mar. 7.

★**Cal., Santa Barbara**—Santa Barbara Co. rejected bid improving Guadalupe-Santa Maria Rd. About $20,000. Work to be done by day labor.

★**Que., Cap de la Madeleine**—Town let contract building concrete sidewalks, to O. Prenovost, c/o N. Bouriquex. About $19,000. Noted June 13.

★**Que., Louisville**—Municipal Council let contract building bituminous macadam roads, to C. D French, c/o Kennedy Constr. Co., Ltd., 137 McGill St., Montreal. Noted Apr. 18.

★**Ont., Toronto**—Toronto & York Highway Comn., 57 Adelaide St., E., let contract grading 15,000 cu.yd. roadway at Locust Hill to Verrocchio & Castellani, 53 Greenlaw Ave. Noted Mar. 28.

RAILWAYS

PRICES AND CONTRACTS AWARDED

(★Indicates award of contract.)

★**Texas**—Gulf, Colorado & Santa Fe Ry. will build 3 mile line from Big Hill Sta. to Big Hill sulphur field of Gulf Sulphur Co., and 70 ft. open deck creosoted pile trestle by day labor. Contract for grading, let to Carroll Roman, Matagorda. Noted June 13.

EXCAVATION AND DREDGING

Proposed Work

N. Y., Jamaica Bay—Excavation—Bd. Estimate, New York City, will appropriate $250,000 to straighten present approach to Mill Island Basin in Jamaica Bay. Project consists of cutting through neck of land, widening present channel from main channel in Jamaica Bay, to basin, to width of 200 ft. and deepening same to 18 ft., dredging interior of basin up to new bulkhead line north and east of present bulkhead and extending bulkhead improvement along front. C. W. Stamford, Pier A, North River, engr.

S. C., Olanta—Drainage—Comrs. Florence Co. soon receives bids building drainage system covering 5000 acres. Project includes cutting 8½ mi. main canal and 6 mi. laterals, etc.

Ind., Anderson—Ditch—Comrs. Madison Co. soon lets contract building ditch involving 1633 cu.yd. excav., 4201 ft. of 8 in. and 1530 ft. of 14 in. tile. C. U. Mohler, supt.

Ill., Garden Prairie—Drainage—A. McCue, secy. Coon Creek D. D., soon lets contract furnishing and laying 68,705 ft. 6-27 in. tile; also building 4 concrete bulkheads, one combination inlet and silt basin.

Minn., New Ulm—Ditch—Brown Co. has postponed plans to build Co. Ditch No. 32. About $45,439. F. D. Minium, Ottomeyer Blk., engr. Noted June 6.

Mo., Chillicothe—Drainage—City election soon to vote on $225,000 bonds to build drainage ditches to care for flood waters of Grand River. Work involves approximately 80,000 acres of land. J. O. Broaddus, city engr.

Idaho, Caldwell—Irrigation—Irrigation Canyon Co. plans to build system in Walters Irrigation Dist. to cover 6000 acres land south of Melba.

Cal., Blythe—Drainage—Palo Verde Mutual Water Co. retained A. W. Phillips, engr. for estimates for drainage of canals.

Cal., Modesto—Drainage—Modesto Irrigation Dist. voted $75,000 bonds to build drainage system. Noted May 23.

BIDS DESIRED

N. Y., Albany—Barge Canal Work—Until July 23, by W. W. Wotherspoon, supt. pub. wks., improving New York State canals as follows. Champlain Canal, Sect. 1 and 2, building concrete capped timber guide cribs near Locks 3, 5 and 6, Contr. No. 168; Erie Canal, Sect. 5, completing canal prism excav. at New York Central R.R. bridge, Brewerton, Contr. No. 188; furnishing, testing and delivering electric capstans and trolley hoists at Pier No. 6, East River and West 53rd St. Pier, New York City; also electric capstans at Utica Terminal lock, Contr. No. 109; advertised in this issue.

N. Y., Buffalo—Excavation—To sub-let in vicinity of Buffalo, 3500 cu. yd. excav. and 500 cu. yd. 2nd class rein.-con. Address W. F. Martens, 245 Cutler Bldg., Rochester. Advertised in this issue.

Ill., Rockford—Drainage—Until July 9, by T. Johnson, clk., of Winnebago Co., building 4878 ft. open ditch 4 ft. bottom width, involving 20,394 ft. 8-30 in. tile.

Ill., Winchester—Drainage—Until July 15, by W. L. Bagshaw, Comr., Scott Co. Drainage and levee, west, building system, involving 138,021 cu.yd. excav. and 160 rods 10 in. tile, also levee on south side of Mauvaisterre creek involving 62,376 cu.yd. excav.

Ia., Corning—Dredging—Until July 3, by W. F. Yeadon, aud. Adams Co., straightening East Nodaway River and building lateral ditches. Work involves 536,180 cu.yd. excav.

Ia., Mason City—Drainage—Until July 1, by G. E. Frost aud. Cerro Gordo Co., building system in D. D. No. 49. Work involves 74,150 ft. 6-26 in. tile, 200 cu.yd. earthwork, etc.

Ia., Sibley—Drainage—Until July 3, by Osceola Co., building system in D. D. No. 41. Work involves 75,000 ft. 6-38 in. tile drain, 800 cu. yd. open ditch, bulkhead inlets, etc. About $44,000. D. W. Clayton, co. aud.

Minn., Marshall—Ditches—Until July 6, by E. S. Shepard, aud., Lyon Co., building Co. Ditch No. 40, involving 4684 ft. 6-24 in. tile, $10,467; Co. Ditch No. 39, involving 15,390 ft. 8-15 in. tile, $4640; Co. Ditch No. 29, involving 67,284 ft. 6-30 in. tile, $29,082.

N. D., Bowman — Excavation — See "Streets & Roads."

Mont., Libby—Excavation—See "Streets and Roads."

Idaho, Grangeville — Excavation — See "Streets and Roads."

Wash., Bellingham — Excavation — See "Water Works."

PRICES AND CONTRACTS AWARDED

(★Indicates award of contract.)

★**N. Y., Albany**—Barge Canal Work—W. W. Wotherspoon, supt. pub. wks., let contract improving river channel below dams at Scotia and Rotterdam, Erie Canal, Sect. 2, Contr. No. 185, to Amer. Pipe & Constr. Co., 112 North Broad St., Phila., Pa., $154,395; installing electric wiring, lighting, power, battery charging equipment and auto truck scales for pier No. 6, East River, New York City, Contr. No. 105, to Lord Electric Co., 105 West 40th St., New York City, $16,000. Noted June 20.

★**Fla., Lake Alfred** — Excavation — See "Streets & Roads."

★**Tenn., Jackson**—Canal—A. W. Stovall chn., let contract building drainage canal in Madison Co., 5.4 mi. long involving 61,962 cu.yd. excav., to J. W. Robins, Tupelo, Miss., 12½c. per cu.yd. Noted June 6.

★**Ind., Huntington**—Drain—Dubois Co. let contract building large drain in connection with Little River ditch, to T. A. Clark, Chicago. About $295,000.

Minn., Glencoe—Until July 1, by McLeod Co., building Judicial Ditch No. 9. Work involves 28,658 ft. 6-12 in. tile and 44,779 cu.yd. excav. About $17,591. F. D. Stocking, aud.

INDUSTRIAL WORKS

Proposed Work

R. I., Woonsocket—W. F. Fontaine, archt., 285 Main St., prepared plans for 3-story, 83 x 211 ft. spinning mill on Cass Ave., owners' name withheld. About $90,000.

Conn., Bridgeport—Susman Feuer Co., 478 Water St., having plans prepared by F. L. McCabe, archt., 261 Eighth Ave., New York City, for 4-story, 53 x 75 ft. warehouse. About $50,000.

Conn., Cocob—Mianus Mfg. Co., 615 4th Ave., New York City, having plans prepared by Lockwood, Greene & Co., archts., 101 Park Ave., New York City, for 4-story, 42 x 145 ft. dye house here. About $40,000.

N. Y., Brooklyn—M. Ginsberg & S. Moss, 122 Livingston St., soon receive bids for 1-story, 71 x 130 ft., brick garage, De Kalb Ave., west of Bushwick Ave. About $35,000. R. L. Short, 370 Macon St., archt.

N. Y., Brooklyn—Rogers & Hagardy, 3rd Ave. and 125th St., New York City, is having plans prepared for 2-story, 100 x 170 ft. brick garage Grand Ave. About $50,000. Carlson & Wiseman, 226 Henry St., archts.

N. Y., Buffalo—Donner Steel Co., 47a Abbott Rd., plans to build rein.-con. steel and brick coke plant to consist of 180 ovens on Abbott Rd. About $3,000,000. H. B. Rose, ch. engr.

N. Y., New York—Interstate Garage Inc., 47 West 34th St., having plans prepared by J. Pettit, archt., 103 Park Ave., for 5 story, 200 x 350 ft. rein.-con. garage and service station on Second Ave. between 47th and 48th Sts. About $1,000,000.

N. Y., Red House—A. B. Smith Co., White Bldg., Buffalo, will soon receive bids for 2-story, 100 x 250 ft. brick and timber chemical plant here. About $35,000.

N. J., Camden—Warren & Webster, Point and Pearl Sts., soon lets contract building 2-story, 43 x 71 ft., rein.-con., steel and brick factory, rein.-con. floor, concrete foundation. Bailinger & Perrot, 17th and Arch Sts., Philadelphia, Pa., archts.

N. J., Jersey City—Bd. Chosen Freeholders, Hudson Co. soon receives bids for power plant. About $500,000. P. A. Vivaritas, 110 4th St., Union Hill, archt.

N. J., Newark—Amer. Oil & Supply Co., Lafayette St., had plans prepared by P. B. Taylor, archt., Essex Bldg., for 1 and 2 story, 60 x 300 ft., concrete, brick and steel warehouse. About $80,000.

Pa., Midland—Crucible Steel Co., Oliver Bldg., Pittsburgh, plans to build additions to its plant here. About $1,000,000.

Pa., Wilkesbarre—Liberty Silk Throwing Co. purchased site on East Church and Walnut Sts., and plans to build a 2 story, 100 x 140 ft. brick mill.

Md., Baltimore—Fleischman Co., 1413 North Charles St., having plans prepared by C. A. Jackson, archt., 693 Washington St., New York City, for 2-story concrete and brick garage, rein.-con. flooring and concrete foundation, at rear of 1413 North Charles St. About $40,000.

Va., Winchester—Virginia Woolen Co. plans to build 4-story addition to plant. About $30,000.

W. Va., Grafton—Baltimore & Ohio R.R., B. & O. Bldg., Baltimore, Md., having plans prepared by M. A. Long, archt., for 12 stall roundhouse. About $150,000. H. A. Lane, ch. engr.

W. Va., Moundsville—United States Smelting Corp., Frisco Bldg., Joplin, Mo., will build large smelting plant here. About $1,000,000. C. E. Marshall, Joplin, Mo., mgr.

W. Va., Mullens—Wyoming Bakery Co. plans to build 3-story, 30 x 110 ft. brick bakery. About $30,000. A. F. Wysong, Bluefield, archt.

N. C., Winston-Salem—Carolina Mills Co. plans to build 3 story, 77 x 113 ft. factory. About $35,000.

Industrial Work (Continued)

Ala., Tuscaloosa—Tuscaloosa Lumber Co. plans to rebuild plant. About $60,000.

La., New Orleans—Delta Shipbuilding Co., recently incorporated with $125,000 capital stock, plans to build shipbuilding plant. R. B. Stanford, Metropolitan Bldg., C. A. Koch, 217 Royal St., and others, incorporators.

La., New Orleans—Gulf States Shipbuilding Co., Ltd., Dallas, Tex., plans to build shipbuilding plant here. S. B. Wathen, pres.

Tenn., Coal Creek—Magnet Knitting Mills, Clinton, plans to build mill here. About $50,000.

Ky., Russell—Chesapeake & Ohio Ry. plans to expend portion of $18,000,000 federal approved budget to build 35 engine stall roundhouse and improve terminal facilities. F. I. Cabell, Richmond, Va., ch. engr. Noted Sept. 13.

O., Cleveland—Cleveland Smelting & Refining Co., 357 Leader News Bldg., will build plant to remelt old and new metals. About $200,000. E. A. Stotter, supt.

O., Cleveland—Osborn Eng. Co., engrs., 2848 Prospect Ave., receives bids about July 1, building 3 units on East 71st St., to include 1-story, 105 x 250 ft. warehouse, 1-story, 30 x 80 ft. garage and 2-story, 50 x 80 ft. office, concrete, steel and brick, rein.-con. floor, concrete foundation, for Fishel & Marks Co., 3014 East 55th St.

Ind., Cannelton—Indiana Cotton Mills Co. plans to build 1-story, 132 x 240 ft. weave shed. Address L. Rodman.

Ind., Indianapolis—Schlinz & Bailey, engrs., 53 Jackson Blvd., Chicago, Ill., soon lets contract 1-story, 38 x 125 ft. addition to garage of Standard Oil Co., Davison and Lord St. About $30,000.

Mich., Battle Creek—Postum Cereal Co. having plans prepared by MacDonald Engr. Co., archts., 53 West Jackson Blvd., Chicago, Ill. for grain elevator. About $300,000.

Mich., Grand Rapids—Grand Rapids Underwear Co., 35 Garden St., plans to build 3-story addition. About $35,000.

Mich., Grand Rapids—A. Leitelt, 211 Erie St., plans to demolish old foundry and build 4- or 5-story brick warehouse.

Mich., Grand Rapids—Sligh Furniture Co., Prescott St., having plans prepared for 5-story, 35 x 146 ft. brick and steel addition. W. M. Clarke, archt.

Mich., Hastings—Consolidated Press Co. has had plans prepared for 150 x 220 ft. foundry and storage building, 75 x 150 ft. pattern shop, etc. F. D. Chase, 122 South Michigan Ave., Chicago, engr.

Ill., Chicago—Chicago Transfer & Clearing Co., 5861 West 65th St., plans to build 1-story warehouse. Cost between $80,000 and $90,000.

Ill., Chicago—Consumers Packing Co. having plans prepared by Packers Arch. & Eng. Co., engrs., 431 South Dearborn St., for large brick factory, rein.-con. floors, concrete foundation, consisting of 4 units and power house, 46th and Loomis Sts. About $450,000.

Ill., Chicago—A. B. Dick & Co., 736 West Jackson Blvd., having plans prepared by S. N. Crowen, archt., 30 North LaSalle St., for 2-story, 209 x 415 ft. factory Lake and Albany Sts. About $300,000.

Ill., Chicago—Hill Clarke & Co., 625 Washington Blvd., had plans prepared by Davidson & Weiss, archts., 53 West Jackson Blvd., for 2- or 3-story, 40 x 189 ft. warehouse and office. About $50,000.

Ill., Chicago—S. Jacobson, Sangamon St. near 12th St., soon lets contract building 2-story, 25 x 100 ft. bakery. Ottenheimer, Stern & Reichert, 220 South State St., archts. About $25,000.

Ill., East St. Louis—Monsanto Chemical Co., 1800 South 2nd St. Louis, Mo., having plans prepared by Bronneke & Fay, engrs., 1204 Fullerton Bldg., St. Louis, Mo., for plant near here. About $1,000,000.

Ill., Marion—H. W. Clark plans to build foundry on North 12th St. About $50,000.

Ill., Monmouth—Monmouth Plow Co., South Main St., soon lets contract for 4-story, 70 x 100 ft. warehouse and salesroom. About $40,000.

Wis., Beloit—Fairbanks Frey Co. does not plan to build foundry as previously noted in our issue of May 30.

Wis., Fond du Lac—Chicago & Northwestern Ry. plans to enlarge roundhouse. About $200,000. W. H. Finley, 148 South Clark St., Chicago, Ill., ch. engr.

Wis., Milwaukee—Dix Investment Co., 215 Graham St., had plans prepared by S. F. Kadow, archt., 451 Mitchell St., for 1-story, 110 x 150 ft. garage. About $25,000.

Wis., Racine—Peifer Radiator Co. had plans prepared for 3-story, 100 x 300 ft. brick factory. About $100,000.

Wis., West Milwaukee (Milwaukee P. O.)—F. J. O'Brien, genl. mgr. Globe Seamless Steel Co., Colby Abbott Bldg., soon lets contract building 1 story, 130 x 170 and 130 x 250 ft., brick, steel and concrete plant.

Kan., Augusta—City plans to build power plant. About $75,000. Black & Veatch, Interstate Bldg., Kansas City, Mo., engrs.

Kan., Badger—Badger Mining and Development Co. will build 150 ton concentration mill. About $60,000. T. E. Forester, 103 Miners Bank Bldg., Joplin, Mo., mgr.

Kan., Ellis—City voted $30,000 to improve electric light plant. Black & Veatch, Interstate Bldg., Kansas City, Mo., engrs.

Kan., Junction City—Union Pacific Ry. plans to build machine shops, round house and power house, etc. About $1,000,000. R. L. Huntley, 15th and Dodge Sts. Omaha, Neb., ch. engr.

Neb., Beatrice—City plans election to vote on $100,000 bonds to build electric lighting, heating and power plant. W. F. Andrews, city engr.

Neb., Broken Bow—Moore Bros., Anselmo, receives bids about July 15, building 3 story, 96 x 112 ft., rein.-con. garage. About $50,000. C. W. Way Co., Hastings, archts.

Neb., Omaha—Haarmann Vinegar & Pickle Co., 1914 South 20th St., plans to build factory at 30th and Boyd Sts. About $100,000.

Mo., Joplin—Klein & Stern Investment Co., Frisco Bldg., will build 150-ton concentration plant. About $35,000.

Mo., Joplin—Muskogee Lead & Zinc Co., plans to build 300-ton concentration mill. About $58,000. E. C. Beatty, Springfield, mgr.

Mo., Kansas City—Jensen-Salsbery, Laboratories, 1320 Main St., having plans prepared for 3-story factory on West Pennway and Pennsylvania Ave. About $100,000. E. O. Brostrom, archt.

Ark., Rogers—Link Pat Mining Co., Joplin, Mo., will build concentration plant and stamp mill. Total cost, $100,000. P. C. Quinn, 530 Main St., Joplin, Mo., supt.

Ark., Zinc—Consolidated Zinc Mines Co., Dallas, Texas, plans to build 400-ton concentration plant here. About $70,000. N. W. Palmer, Muskogee, Okla., supt.

Tex., Galveston—Brush Electric Co., 2424 D St., plans to rebuild power plant on 26th and Postoffice Sts. About $50,000.

Tex., Marshall—Marshall Mill & Elevator Co., Texas & Pacific tracks, plans to rebuild grain elevator and flour mill, concrete. About $75,000.

Tex., Marshall—Texas & Pacific Ry., 1410 Main St., Dallas, plans to rebuild general shops here recently destroyed by fire. Loss about $500,000. Project includes main machine shops, airbrake and coppersmith departments, tool room, power plant and boiler shops. E. F. Mitchell, Dallas, ch. engr.

Okla., Douthat—Century Mining Co. will build concentration plant and install equipment in same. Total cost $60,000.

Okla., Durant—Durant Grain & Elevator Co. plans to build storage building with 150,000 bu. capacity and corn mill with 500 bbl. capacity. E. M. Stewart, Mgr.

Okla., Miami—Aurora Mining Co. plans to build 150-ton concentration plant east of Leadville. About $60,000. J. W. Hale, Miami, supt.

Okla., Oklahoma—Waxahachie Mining Co., plans to build 150-ton concentration mill near Leadville. About $60,000. J. Hare, mgr.

Okla., Okmulgee—Depot—St. Louis & San Francisco Ry. plan to build 2-story, 60 x 460 ft. brick freight station on Main and Fifth Sts. About $60,000. F. G. Jonah, St. Louis, Mo., ch. engr.

Okla., Peoria—Nebo Lead & Zinc Co. will build concentration plant and equip same. About $60,000. R. C. Croslin, supt.

Okla., Quapaw—Miami Mine will build 400 ton mill concentration plants. About $250,000. J. P. McNaughton, 8 A St., S. E., Miami, supt.

Okla., Tar River—Maxine Mining Co., incorporated with $250,000 capital stock, plans to build concentration plant at zinc mine. About $80,000. W. C. Miller, Hancock, Bldg., Miami, supt.

Colo., Loveland—City voted $79,000 bonds to build light plant.

Colo., Sterling—L. Spelts and J. McShane, 125 North Front St., soon lets contract building 2-story, 75 x 135 ft., rein.-con. garage. About $50,000. Wilson & Wilson, 605 Commonwealth Bldg., archts.

N. M., Las Vegas—Federal Light & Power Co. plans to improve local light and power plant. About $100,000 will be expended on project.

Wash., Seattle—Currin & Greene Shoe Mfg. Co., Western Ave. and Clay St. received low bids building factory, from Warrack Constr. Co., Arcade Bldg., $29,240; Western Constr. Co., $29,963; Finne & Gjarde, Northern Bank Bldg., $31,600.

Wash., Vancouver—Amer. Can Co., Failing Bldg., Portland, Ore., receives bids in two or three months, for 4-story, 100 x 300 ft., concrete plant here.

Wash., Walla Walla—Walla Walla Meat & Cold Storage Co., 216 East Main St., plans to rebuild packing plant. About $75,000.

Ore., Portland—Balfour Guthrie Co., having plans prepared for large addition to plant on Willamette River. Project includes new head and cleaning house and 24 bins, rein.-con., will require considerable pile foundation and extension of dock facilities.

Cal., Oakland—Spencer Kellogg & Sons Linseed Oil Co., Monadnock Bldg., San Francisco, plans to build large plant.

N. S., Halifax—Halifax Shipyards, Ltd., Montreal, Que., incorporated with $6,000,000 capital stock, plans to build shipbuilding plant here to cost, $3,000,000. Norcross Bros., Montreal, interested.

N. S., Stellarton—W. P. McNeil plans to build munition plant. About $60,000.

N. S., Tusket—Argyle Shipbuilding Co. plans to build plant. About $100,000.

Que., Cote St. Paul—Crane, Ltd., Montreal, recently incorporated, plans to build large plant on St. Patrick St., to be constructed on unit plan; initial expenditure, $400,000.

Industrial Work (Continued)

Ont., Brampton—Hercules Rubber Co., plans to build plant. About $60,000. T. Thauburn, interested.

Ont., Fenelon Falls—Wood Turning Products Co. plans to build a 1-story concrete factory. About $40,000.

Ont., Galt.—Roelofson Machine Tool Co., Beverley St., plans to build brick addition to machine shop. About $40,000. J. Evans, 30 Water St., archt.

Ont., Hamilton—Otis-Fensom Elevator Co., Victoria St., N., plans to build addition to plant. About $40,000.

Ont., Toronto—Canadian Pacific Ry. plans to build machine shop and addition to engine house on John St. About $35,000. J. M. Fairbairn, Montreal, Que., asst. ch. engr.

Ont., Windsor—Driver Harris Co., Harrison, N. J., secured site here, and plans to build plant. About $60,000.

B. C., Beaver Cove—Beaver Cove Lumber & Pulp Co., London Bldg., Vancouver, having plans prepared for lumber and pulp mills here. About $250,000. W. H. White, genl. mgr.

B. C., North Vancouver—Great Northern Canneries Co. having plans prepared for cold storage plant. About $75,000.

B. C., Vancouver—Defiance Packing Co., Ltd., 510 Hastings St., W., having plans prepared for cold storage plant. About $20,000. A. H. Sherman, mgr.

B. C., Vancouver—Dept. of Mines, Ottawa, having plans prepared for ore testing plant here. About $100,000.

BIDS DESIRED

N. Y., Buffalo—Strong Steel Co., 33 Norris St., is receiving bids for 1-story, 80 x 300 ft. concrete, steel and brick foundry and machine shop. About $75,000.

N. Y., Niagara Falls—Bids are being received by Mills, Rhines, Bellman & Norhoff, archts., Ohio Bldg., Toledo, O., for 1-story, 150 x 300 ft. rein.-con. brick and steel factory on Highland Ave., here, for United States Light & Heat Co., 3215 Highland Ave. About $75,000.

Pa., Reading (West Reading)—Until June 30, by Narrow Fabric Co., Wyomissing, building 5 story, 104 x 222 ft., rein.-con., steel and brick fabric plant. About $30,000. A. Mayer, Textile Machine Wks., Wyomissing, archt.

Ky., Louisville—Meyer & Brenner, archts., 343 Paul Jones Bldg., is receiving bids for 3 story, 51 x 64 ft. brick mill construction, addition to cotton mill for Semple Mfg. Co., 1570 Story Ave.

S. D., Huron—Until July 15, by Packers Archt. & Eng. Co., Manhattan Bldg., Chicago, building 4-story, 90 x 235 ft. packing plant and 65 x 90 ft. boiler house, fireproof construction, for Farmers' Coöperative Packing Co. About $500,000. Noted May 2.

PRICES AND CONTRACTS AWARDED

(★Indicates award of contract.)

★**Mass., Boston**—M. Rudnick, 40 Court St., will build 1-story, 50 x 200 ft. garage by day labor. About $60,000.

★**R. I., Pawtucket**—Potter & Johnston Co., Newport Ave., let contract building 1-story, 171 x 486 ft., steel and brick, shell plant, to O. D. Purington & Co., Industrial Trust Bldg., Providence. About $150,000; cost plus percentage.

★**N. Y., Brooklyn**—J. Acomadelo, 215 Montague St., will build 2-story, 25 x 100 ft. brick garage, Lexington Ave., near Patchen Ave., by day labor. About $25,000.

★**N. Y., Kingston**—Herbert Brush Co., 12 Thomas St., let contract building 3-story, 50 x 128 ft. concrete, brick and timber factory on Greenkill Ave., to C. Michaud, Kingston. About $35,000.

★**N. Y., Long Island City**—Rosenwaser Bros., Orchard St. and Jackson Ave., let contract building 3-story, 50 x 100 ft. factory, Queens St., to W. J. Bond, 12 Hallett St., Astoria, L. I., $26,000.

★**N. Y., New York**—The 352 West 41st St. Co., Inc., 55 Liberty St., let contract 2-story, 80 x 197 ft. garage to be built at 351-57 West 40th St., to G. B. Hopper, 15 East 40th St., New York City. About $45,000.

★**N. Y., Niagara Falls**—Hydraulic Power Co., Hydraulic Canal, let contract for substructure for proposed 1-story, 100 x 300 ft. hydro electric plant to be built on Canal Basin, to Dock Contg. Co., 95 River St., Hoboken, N. J. Cost of entire plant, $1,000,000.

★**N. Y., Ogdensburg**—City let contract building public market on Isabella and Ford Sts., to Whalen & Burns, Ogdensburg, $48,800. Noted June 20.

★**Ga., Buford**—Bona Allen, Inc., will build 2-story 45 x 200 ft. factory by day labor.

★**La., Shreveport**—Caddo Storage & Warehouse Co. let contract building 1-story, 50 x 150 ft., rein.-con. warehouse, rein.-con. floor, concrete foundation, to C. H. Moores Eng. Corp., 38 South Dearborn St., Chicago. About $85,000.

★**Ky., Madisonville**—J. L. Burchfield let contract building 115 x 250 ft., brick and steel warehouse, to Pan-Amer. Bridge Co., New Castle Ind. About $35,000.

★**O., Cleveland**—K. V. Painter, 3240 Fairmount Blvd., let contract building 2-story, 108 x 132 ft., concrete, steel and brick factory and salesroom, rein.-con. floor, concrete foundation, at 1979 East 61st St., to A. W. Kilbourne Co., 505 Swetland Bldg. About $50,000.

★**O., Findlay**—Grant Motor Car Corp., Kirley Ave., Cleveland, let contract building factory consisting of 6 units, to be 1 story, 50 x 190 ft., 2 story, 50 x 210 ft., 1 story, 30 x 68 ft. and 1 story office building, to W. I. Thompson & Son Co., 6110 Euclid Ave., Cleveland. About $100,000.

★**Ind., Indianapolis**—The Indianapolis Bleaching Co., Washington St. and White River, let contract building 1 story, 144 x 144 ft. addition to factory, to W. P. Jungclaus Co., 825 Massachusetts Ave. About $40,000.

★**Mich., Battle Creek**—Rich Steel Prod. Co. let contract building 1-story, 49 x 112 ft. warehouse and 49 x 256 ft. shop, brick, rein.-con. floor, concrete foundation, to C. Rasmussen, 154 West Randolph St., Chicago.

★**Mich., Detroit**—Hoppenstal Forge & Knife Co., Dime Bank Bldg., let contract building garage and warehouse, to Cooper Widenman Constr. Co., 854 Penobscot Bldg. About $30,000.

★**Ill., Chicago**—Industrial Building Co., 35th St. and Western Ave., will prepare plans and supervise construction of oil distributing station here to consist of 2-story, 58 x 200 ft. warehouse, 1-story pump house, 30 x 170 ft. garage and machine shop, eleven 20,000 gal. storage tanks and 13 lubricating tanks, all buildings rein.-con., concrete floors and foundation; about $150,000. Also system of central oil stations to be built in 15 Illinois towns; about $150,000. (Owners names and locations withheld.)

★**Wis., Milwaukee**—United Storage Co., 235 East Water St., let contract building 6-story, 60 x 140 ft., rein.-con. warehouse, rein.-con. floor, concrete foundation, to C. H. Moores Eng. Co., 38 South Dearborn St., Chicago. About $100,000. Noted Apr. 11.

★**Minn., Marshall**—Marshall Flour Milling Co. let contract for grain storage building to MacDonald Eng. Co., 53 West Jackson Blvd., Chicago, Ill. About $75,000.

★**Minn., Minneapolis**—Gas Traction Fdry. Co., 2907 4th St., S. E., let contract 1-story, 40 x 300 ft. addition to foundry, to S. M. Klarquist & Son, Security Bldg. About $25,000. Noted Mar. 14.

★**Neb., Havelock**—Hebb Motor Co., 133 P St., Lincoln, let contract building 2 story, 240 x 416 ft., brick and steel, to W. J. Assenmacher, 12 Orpheum Bldg., Lincoln. About $250,000. Noted Apr. 4.

★**Neb., Lincoln**—S. Congilow, 1004 P St., let contract for 2-story, 60 x 142 ft. garage to G. Tobin, 2105 E. St. About $29,850.

★**Neb., Omaha**—Nebraska Buick Auto Co. let contract building 4-story, 88 x 136 ft., rein.-con. and brick garage and salesroom, rein.-con. floor, concrete foundation, at 1901 Howard St., to G. W. Stiles, 11 South La Salle St., Chicago. About $150,000; cost plus percentage. Noted Mar. 7.

★**Neb., Omaha**—Omaha Crockery Co., 1116 Harney St., let contract building 5 story, rein.-con. addition, to Parsons Constr. Co. About $100,000. Noted May 30.

★**Tex., Ft. Worth**—Burney & Tillar, 1202 Burk Burnett Bldg., let contract building 100 x 100 ft. brick garage, to B. F. & C. M. Davis, 2nd and Brookshire Sts. About $25,000. Noted May 23.

★**Colo., Sterling**—Colorado Power Co., 828 Symes Bldg., Denver, will build power plant here by day labor. About $150,000.

★**Wash., Seattle**—Centennial Mill Co., Hoge Bldg., let contract 2-story, 70 x 135 ft. warehouse and 1-story, 38 x 48 ft. office building, concrete, on East Marginal Way and Dakota St., to Hurley-Mason Co., Hoge Bldg., $54,000.

★**Wash., Seattle**—Gulowsen-Grei Engine Co., Alaska Bldg., let contract building 2 story, 174 x 300 ft. engine plant, Salmon Bay Dist., consisting of 174 x 300 ft. machine shop and office, 94 x 132 ft. foundry, 30 x 90 ft. pattern shop, etc., to M. Arveson, Down Blk., $126,500. Noted May 30.

★**Wash., Seattle**—Port. Comn., Seattle, let contract building 2-story, 147 x 300 ft. warehouse, Spokane St., to P. A. Harrington & Co., Whatcom and Hanford Sts. About $68,000. Noted May 30.

★**Que., Montreal**—Caron Bros., 233 Bleury St., let contract building 2 story brick factory, to Anglins, Ltd., 65 Victoria St., About $100,000.

BUILDINGS

Proposed Work

Conn., Bridgeport—Bank—City Natl. Bank retained W. R. Briggs, archt., Security Bldg., to prepare plans for 60 x 130 ft., Main and Bank Sts.

Conn., Hartford—School—North East School Dist. voted to appropriate $250,000 to build new school. Whiton & McMahon, archts., 36 Pearl St., preparing plans.

Conn., Waterbury — Hotel — Connecticut Awning Co. c/o M. E. Keeley, 51 State St., having plans prepared by G. Kiester, archt., 56 West 45th St., New York City, for 8-story, 90 x 176 ft. About $600,000.

N. Y., Brooklyn—School—Bd. Educ. had plans prepared by B. J. Snyder, archt., 59th St. and Park Ave., for Public School, 54 Nostrand Ave. About $500,000.

N. Y., New York—Chapel, Club and Nursery—University Place, Presbyterian congregation, 11th St. and University Pl., plans to build 4-story, 50 x 91 ft., brick, at 198 Bleecker St. About $100,000. G. B. Post Sons, 101 Park Ave., archts. Noted June 6.

N. Y., New York—Hospital—McDonough Memorial Hospital having plans prepared by V. W. Tandy, archt., 1931 Bway., building 6-story, 56 x 80 ft., brick, concrete foundation, at 20 West 33rd St. About $100,000.

N. Y., New York—Theater and Stores—City Real Estate Co., 176 Bway., plans to build 2-story, 189 x 213 ft., on Bway., 160th St. and Ft. Washington Ave. About $100,000. H. J. Krapp, 116 East 16th St., archt.

N. J., Ft. Lee—Schools—Bd. Educ. plans to build 4 story, brick school. About $157,000.

N. J., Haskell—School—Bd. Educ., Wanaque, plans to build 2-story, brick. About $60,000. Van Vland & Culver, 140 Market St., Paterson, archts.

N. J., Hoboken—City Comrs. granted permission to the National War Council of Y. M. C. A. to build brick building on Hudson Square Park. About $50,000.

Buildings (Continued)

N. J., Newark—School—Bd. Educ. rejected bids received June 3, building Hawkins St. school. Project indefinitely postponed. Noted May 23.

N. J., Trenton—Home—New Jersey Children's Home Society, Forst-Richey Bldg., plans to build home. About $100,000. J. C. Tattersall, 407 West State St., ch. bldg. com.

Pa., Allentown—Temple—Allentown's Masonic Temple Association, Lentz Bldg., plans to build a temple. About $200,000. M. P. Schamtz, pres.

Pa., Phila.—Stations—City Transit Dept. soon receives bids building 2 "L" stations on Girard Ave. and York St., and 2 on Somerset and Allegheny Aves., cost $50,000 each. A. Quimby, City Transit Dept., engr.

N. C., Charlotte—Theater—S. A. Lynch, Arcade Bldg., Jacksonville, Fla., W. H. Wood and G. Stephens, Charlotte, plan to build theater on South Tryon St. Cost between $60,000 and $75,000.

S. C., Columbia—Hospital—South Carolina Baptist Hospital plans to build 8 story, 104 x 208 ft. steel, concrete, brick and stone.

Ga., Macon—Clinic—City plans to build 1 story, 28 x 60 ft. clinic ward at City Hospital. About $75,000.

Fla., Miami—Cathedral—Scottish Rite Masons plan to build in Ft. Dallas Park. Plan includes erection of dock along water front. About $50,000.

Ala., Sheffield—Exchange—Southern Bell Telephone Co., 1814 2nd Ave., Birmingham, plans to build 2-story, 50 x 120 ft. brick, on Nashville Ave. between 4th and 5th Sts. About $60,000.

La., Lake Charles—Sanitarium—St. Patrick's Sanitarium had plans prepared for addition. About $70,000.

O. Toledo—Hospital—G. B. Rheinfrank, archt., 601 Gardner Bldg., soon receives bids building 2-story, 180 x 210 ft. for Maternity and Children's Hospital, 317 Colton Bldg. W. W. Brand, pres.

Mich., Bessemer—School—J. D. Chubb, archt., 109 North Dearborn St., Chicago, receives bids about July 15, for 3-story, 159 x 240 ft. brick and steel, rein.-con. floor, concrete foundation, for Bd. Educ. About $160,000. Noted June 6.

Mich., Highland Park—Hospital—City plans to build. About $300,000. M. J. Sturn, 116 South Michigan Ave., Chicago, Ill., archt.

Mich., Muskegon — Home — Muskegon-Holland Home Association, care of H. E. Langeland, Muskegon Ave. and Cedar St., plans to build home for aged. About $200,000.

Ill., Bloomington—Sanitarium—McLean Co. lets contract about July 1, building 2-story brick. About $75,000. A. L. Pillsbury, 710 Peoples Bank Bldg., archt. Noted May 9.

Ill., Chicago—Library—Chicago Public Library, c/o C. B. Roden, Washington and Michigan Aves., having plans prepared by A. S. Alschuler, archt., 28 East Jackson St. for 2-story, 97 x 121 ft. About $75,000.

Ill., Chicago—Office—See "Industrial Works."

Ill., Elmhurst—School—Bd. Educ. having plans prepared by Perkins, Fellows & Hamilton, archts., 814 Tower Court, Chicago, for 1-story, 150 x 150 ft., brick and rein.-con., rein.-con. floor, concrete foundation. About $80,000.

Ill., Oak Park—Church—First Baptist Congregation plans to build on Ontario St. and Oak Park and Grove Aves. About $150,000.

Ill., Rushville—Church—Methodist Episcopal congregation soon lets contract building 1-story, 75 x 90 ft. About $50,000. L. F. W. Steube, Adams Bldg., Danville, archt.

Wis., Ashland — Sanitarium — Ashland, Bayfield and Iron Counties, c/o W. E. Tripp, Iron River, plan to build. About $100,000. H. Wildhagen, 513 West 2nd St., archt.

Wis., Jefferson — Sanitarium — Jefferson Co. Comrs. plan to build. About $50,000.

Wis., Kenosha—School—Bd. Educ. having plans prepared by J. D. Chubb, archt., 109 North Dearborn St., Chicago, for 3-story, 300 x 300 ft.

Wis., Manitowoc—Hotel—J. M. Kadow receives bids in September building 4 story, 40 x 130 ft. S. F. Kadow, 451 Mitchell St., Milwaukee, archt. Noted May 30.

Wis., Superior—School—Bd. Educ., c/o L. A. Nichols, secy., having plans prepared by F. A. Johnson, archt., 507 Alworth Bldg. for 1 story, 16 x 280 ft., and 2 story, 117 x 135 ft. brick. About $150,000.

Wis., Wauwatosa—Home—St. Joseph's Home having plans prepared by W. G. Herbst, archt., 721 Caswell Blk. About $50,000.

Ia., Des Moines—High School—Bd. Educ. plans to build. About $500,000.

Ia., Hartwick—School—Bd. Educ. having plans prepared building 2-story, brick. About $50,000. J. E. Folke, secy. C. A. Dieman & Co., 408 Granby Bldg., Cedar Rapids, archts.

Ia., Indianola—Central—Simpson College plans to rebuild. About $100,000.

Minn., Mankato—School—New Union School Dist. voted $100,000 bonds to build school. G. Widell, chn. bldg. com.

Kan., Bonner Springs—School—Bd. Educ. having plans prepared by Smith, Rea & Lovitt, archts., 602 Finance Bldg., Kansas City, Mo. for 2-story brick and stone. About $50,000.

Kan., Columbus—School—Bd. Educ. soon lets contract building 2 story, 115 x 137 ft., brick, concrete foundation. About $50,000. Maxwell & Maxwell, Pittsburgh, archts.

Kan., Leavenworth—Community School—Bd. Educ. plans to build 2 story, 96 x 130 ft., brick, steel, and rein.-con. About $80,000. T. W. Williamson & Co., 418 Central Natl. Bank Bldg., Topeka, archts.

Neb., Fall City—Hotel—Nebraska Bldg. & Investment Co. having plans prepared by J. W. Salmon, archt., 113 South 13th St., for 4-story, 100 x 100 ft., brick. About $165,000. F. E. Shaf, pres.

Neb., Holmesville—School—Consolidated School Dist. plans to build school. About $50,000.

Neb., Omaha—Laboratory—State Bd. Control, Lincoln, soon lets contract building 2-story, 101 x 102 ft. About $120,000. J. S. Dales, Lincoln, secy. J. Lotenser & Sons, 626 Bee Bldg., archt.

Wyo., Lusk—Court House—Niobrara Co. election Nov. , to vote on $60,000 bonds to build county court house.

Mo., Columbia—School—University of Missouri plans to build school of journalism. About $50,000.

Mo., Joplin—Hotel—Connor Investment Co., Miners Bank Bldg., plans to build 2 story, 60 x 180 ft. brick addition on 4th and Joplin St. About $30,000. A. C. Michaelis, Miners Bank Bldg., archt.

Mo., Kansas City—Bank—Federal Reserve Bank plans to build on 10th St. and Grand Ave. About $750,000.

Mo., Kansas City—Theater—Frank L. Newman, c/o Theater Royal, plans to build steel and rein.-con., moving picture theater at 1112-18 Main St., 6 story, 97 ft. 4 in. x 127 ft. About $250,000. H. A. Drake, 315 Reliance Bldg., archt.

Tex., Beaumont—Lodge—Beaumont Elks soon let contract. Watson & Steinman, Temperance Bldg., archts. About $60,000.

Tex., Blythe — School — Blythe School Dist. voted $100,000 bonds to build brick school.

Tex., Paris—Church—Centenary and Lamar Ave. Methodist Episcopal congregations have merged into the First Methodist congregation and will build a church. About $100,000.

Okla., Muskogee — Hospital — Okmulgee Baptist Hospital having plans prepared by E. E. McKibban, archt., McKibban Bldg., for rein.-con. About $50,000. Noted May 23.

Utah, Ogden—Hospital—Dee Memorial Hospital having plans prepared by L. S. Hodgson, archt., Perry Bldg., for addition to hospital. About $50,000.

Cal., San Fernando—Hospital—Bd. Supervs. Los Angeles Co., Los Angeles, had plans prepared for hospital to be built here. About $100,000.

Cal., San Francisco—Office and Cafeteria—Risdon Iron Wks., 20th and Illinois Sts., having plans prepared by J. R. Miller, archt., Lick Bldg. About $100,000.

Ont., Ottawa—School—Province of Ontario plans to build addition to Ottawa Technical School, Albert St. About $100,000. J. A. Ewart, Booth Bldg., archt.

Ont., Toronto—Schools—Bd. Educ. plans to build 3 story brick on Perth Ave. and 3 story brick on Bolton Ave. About $93,000 and $100,000 respectively.

B. C., Esquimalt—High School—Bd. Educ. plans to build brick school. About $50,000. W. Greaves, chn.

BIDS DESIRED

N. Y., Brooklyn—School—Until July 10, by C. B. J. Snyder, supt. school bldgs., Room 2800, Municipal Bldg., New York City, building P. S. No. 29, Henry St. between Baltic and Harrison Sts.

N. Y., Cattaraugus—School—Until July 15, by Bd. Educ., building 3 story, 75 x 128 ft., brick. About $100,000. W. T. Towner, 366 5th Ave., New York City, archt. Noted May 30.

N. Y., New York—Hospital—Until July 20, by A. L. Abramson, archt., 220 5th Ave., remodeling two, 3 story, buildings at 169th St. and Fulton Ave. into hospital and dispensary, for Bronx Hospital, 1385 Fulton Ave. About $50,000.

N. Y., Niagara Falls—Parochial School—Bids are being received by W. H. Zawadski, archt., 798 Fillmore Ave., Buffalo, building 2-story, 60 x 125 ft., rein.-con., steel and brick, on Niagara and 24th Sts., for St. Stanislaus Kostka Church. About $75,000.

N. Y., Watertown—Office—Until July 16, by C. E. Dewey, archt., Utilities Bldg., building 3-story, 50 x 80 ft., concrete, steel and brick, on Moulton and Mills Sts., for R. Wise.

O., Akron—Club and Office—Until July 12, by Boenisch, Krause & Helmkamp, archts., 316-17 Ohio Bldg., for 3-story, 66 x 162 ft. rein.-con. and brick, East Market and Summit Sts., for Eagles Home Co., East Market St. About $110,000. Noted May 9.

O., Cleveland—Office—See "Industrial Works."

O., Columbus—Administration and Cottages—Until July 9, by State Bd. Administration, Oak and 9th Sts., building 48 x 86 ft. administration building and two 1-story, 100 x 100 ft. cottages, brick and concrete. About $100,000. Noted May 2.

Wis., Stevens Point—Bank—Until July 1, by Brust & Phillips, archts., 506 Free Press Bldg., Milwaukee, building 1- and 2-story, 56 x 114 ft., for First Natl. Bank. About $70,000. Noted June 30.

Ia., Rembrandt—School—Until July 9, by Consolidated School Dist., building 2 story, 58 x 90 ft., brick. About $50,000. Martin & Sutherland, Storm Lake, archts. Noted June 6.

Buildings (Continued)

Kan., Baxter Springs—High School—Until July 1, by O. W. Fail, city clk., building high school. About $99,000.

PRICES AND CONTRACTS AWARDED
(★Indicates award of contract.)

★**Mass., Boston**—Office—State Waterways Comn., State House, let contract building on dry dock, South Boston, to Weiss Constr. Co., 40 Court St. Noted May 16.

Mass., Malden—Fire House—City received low bids building 2-story, 60 x 110 ft., brick and steel, concrete foundation, Salem and Sprague Sts. from D. G. McDonald, 164 Dudley St., Roxbury, $53,970; J. Bowen, 184 Dudley St., Roxbury, $54,900. Noted May 23.

★**Mass., Wellesley**—Parish House—Congregational Society, C. N. Taylor, chmn. Bldg. comn., let contract building 1-story, 32 x 60 ft. and 2-story, 32 x 75 ft., brick, to Leighton-Mitchell Co., 95 Milk St., Boston. About $50,000. Noted June 6.

★**Conn., Darien**—Bank—Home Bank & Trust Co. let contract building 3-story 41 x 75 ft. granite, brick and limestone, to F. H. Wakeham, 4 West 47th St., New York City. Noted May 9.

★**N. Y., New York**—Hospital—New York Homeopathic and Flower Hospital, Eastern Blvd., let contract altering 3 story factory at 423 East 63rd St., into hospital, to Fountain & Choate, 110 East 23rd St. About $100,000.

★**N. Y., New York**—Studios, Loft, etc.—Hamilton Fish Estate, 14 Wall St., let contract altering 7 buildings at 38-46 3rd Ave. and 294 East 10th St., into studios, loft and offices, to A. J. Robinson Co., 123 East 23rd St., $50,000.

N. Y., Philmont—Hospital—Bd. Superv. Columbia Co., Hudson, received low bids, June 14, building 2-story, 80 x 200 ft., tuberculosis hospital, brick, tile and timber, from Moody Eng. Co., 115 Bway., New York City, $47,963; Gillies-Campbell Co., 101 Park Ave., New York City, $57,764; G. F. Kelly, Yonkers, $58,788. Prices do not include plumbing, heating and lighting. Noted May 30.

★**N. Y., Whitesboro**—High School—Bd. Educ. let general contract, to City Constr. Co., 300 Wadsworth St., Syracuse, $77,179; heating contract, to T. Breen Co., 414 La Fayette St., Utica, $19,250. Noted June 6.

★**Fla., Belleair**—Swimming Pool and Casino—Bellevue Hotel let contract building 106 x 129 ft. brick, to G. A. Miller, 28 Petteway Bldg., Tampa. About $75,000.

★**Fla., Gainesville**—Assembly Hall, etc.—State Bd. Control let contract building 3 story assembly hall, etc., to Fuquy & Ghee, Daytona. About $50,000. Noted May 30.

★**O., Findlay**—Office—See "Industrial Works."

★**Ill., Stonington**—High School—Bd. Educ. let contract building brick school to J. Lorchelder, Springfield. About $50,000. Noted May 16.

★**Wis., Wauwatosa** — Cottage — Milwaukee Co., Milwaukee, let contract building 2-story, 32 x 160 ft., to Immel Constr. Co., 200 North Main St., Fond du Lac. About $80,000.

★**Ia., Cedar Rapids**—Y. M. C. A. let contract for 4-story, 100 x 140 ft., brick and rein.-con. building, 1st Ave. and 5th St., E., to J. F. Leefers & Co., 807 Amer. Trust Bldg. About $150,000.

★**Minn., Duluth**—School—Bd. Educ. let contract building addition to E. R. Cobb School, to W. Fawcett, Ex. Bldg. Noted Feb. 28.

★**Kan., Pittsburg**—Hospital—Sisters of St. Joseph let contract building 3-story, 50 x 138 ft., to H. L. Stevens Co., 910 South Michigan Ave., Chicago. About $100,000. Noted March 2.

★**Neb., Omaha**—Church—Central Congregational church let contract building 3-story, 62 x 92 ft., concrete, steel and brick, concrete foundation, at 3545 Harney St., to J. Black, Masonry & Contg. Co., St. Louis, Mo. About $55,000; cost plus percentage.

★**Neb., Omaha**—Church—Holy Angels congregation let contract building 55 x 124 ft., brick, concrete and steel, rein.-con. floor, concrete foundation, at 2720 Fowler Ave., to McGowan & Jacobberger. About $50,000.

★**Wyo., Casper**—City Hall—City let contract 2-story, brick and timber, rein.-con. floor, concrete foundation, to A. Danielson, 1641 Vine St., $76,554.

★**Okla., Norman**—Geology—State Bd. Pub. Affairs, Oklahoma, let contract 3-story, 80 x 120 ft., brick and rein.-con. to Holmboe Co., 311 Majestic Bldg., Oklahoma, $88,800. Noted June 13.

★**Wash., Olympia**—Hotel—Olympia Hotel Co. let contract building 4 story, 120 x 120 ft. rein.-con., steel and brick, on 6th and Washington Sts., to Henrikson & Co., Globe Bldg., Seattle, about $200,000.

★**Wash., Seattle**—Office—See "Industrial Works."

★**N. S., Halifax**—Hotel—Carlton House, Ltd., let contract building addition, to Rhodes, Curry Co., Ltd., Windsor St. About $50,000.

FEDERAL GOVERNMENT WORK

Proposed Work

N. Y., New York—Building—Bureau Yards & Docks, Navy Dept., Wash., D. C., plans to build building D, for aero storage; Spec. No. 3137. About $275,000.

N. Y., New York—Court Yard Building—Bureau Yards & Docks, Navy Dept., Wash., D. C., plans to build between Buildings Nos. 128 and 129; Spec No. 3138. About $100,000.

N. Y., New York—Electric Lighting and Power System—Bureau Yards & Docks, Navy Dept., Wash., D. C., plans to install at shipbuilding slip No. 2; Spec. No. 3136. About $20 000.

N. Y., Rockaway—Cinder Surfacing—Bureau Yards & Docks, Navy Dept., Wash., D. C., plans; Spec. No. 3139. About $40,000.

Wash., D. C.—Electric School—Bureau Yards & Docks, Navy Dept., Wash., D. C., received no bids building for U. S. electrician at Naval Operating base, Hampton Roads, Va.; Spec. No. 3064. Noted June 20.

BIDS DESIRED

Conn., New London—Repairing Runway—Until July 1, by Bureau Yards & Docks, Navy Dept., Wash., D. C., repairing for marine railway; Spec. No. 3132. About $20,000. Noted June 20.

Pa., Phila.—Dredging—Until July 19, by U. S. Eng. Office, Phila., dredging in Delaware River on Baker and Liston light house ranges.

Pa., Phila.—Mechanical Equipment, etc., Until July 8, by Bureau Yards & Docks, Navy Dept., Wash., D. C., installing equipment in piping boiler plant; Spec. No. 3049. About $75,000. Noted May 30.

Del., Wilmington—Jetty Repairs—Until July 19, by U. S. Eng. Office, Old Federal Bldg., Wilmington, repairing jetty at mouth of Broadkill River.

Md., Indian Head—Buildings—Until July 1, by Bureau Yards & Docks, Navy Dept., Wash., D. C., building 11 additions to power plant; Spec. No. 3045. About $338,500. Noted May 30.

Md., Indian Head—Chemical Laboratory—Until July 1, (change of date) by Bureau Yards and Docks, Navy Dept., Wash., D. C., remodeling laboratory; Spec. No. 3096. About $20,000. Noted June 20.

Wash., D. C.—Boiler—Until July 2, by Dept. of Interior, Wash., furnishing and erecting boiler at St. Elizabeth's Hospital. S. G. Hopkins, asst. secy.

Wash., D. C.—Dispensary—Until July 1, by Bureau Yards & Docks, Navy Dept., Wash., D. C., building at Anacostia; Spec. No. 3113. Noted June 20.

Wash., D. C.—Railroad Extension—Until July 1, by Bureau Yards & Docks, Navy Dept., Wash., D. C., building at St. Juliens Creek, Va.; Spec. No. 3100. About $30,000. Noted June 20.

Va., Norfolk—Generating Plant, Etc.—Until July 1, by Bureau Yards & Docks, Navy Dept., Wash., D. C., building generating plant, powerhouse, installing piping and laundry eqipment, etc., at Hospital Reservation. Spec. No. 3129. Noted June 20.

Fla., Pensacola—Fill, Pavement, etc.—Until July 8, by Bureau Yards & Docks, Navy Dept., Wash., D. C., building testing shed, bulkhead, fill and pavement; Spec. No. 3076. About $20,000. Noted June 13.

Ill., Great Lakes—Officers Material School—Until July 8, by Bureau Yards & Docks, Navy Dept., Wash., D. C.; Spec. No. 3090. About $150,000. Noted June 13.

Kan., Eldorado—Post Office—Until July 18, by J. A. Wetmore, superv. archt., treas. dept., Wash., D. C.; advertised in this issue.

Tex., Clint—Canals—Until July 16, by U. S. Recl. Serv., El Paso, building canals on Rio Grande Irrigation Project on New Mexico-Texas state line near here. Work involves 30,000 yd. excav.

N. M. Shiprock—Supply and Distributing System—Until July 18, by C. Sells, comr. Indian Affairs, Wash., D. C., building sewer, water and distributing systems at Toadlene School under jurisdiction of San Juan School here.

Cal., San Diego—Water System—Until July 15, by Bureau Yards & Docks, Navy Dept., Wash., D. C.; Spec. No. 3074. About $11,500.

PRICES AND CONTRACTS AWARDED
(★Indicates award of contract)

N. H., Portsmouth—Barracks—Bureau Yards & Docks, Navy Dept., Wash., D. C., received bids building marine barracks (work complete), from Peck Lumber Co., 101 East Market St., Scranton, Pa., $238,289 (90 days). Noted June 20.

★**Conn., New Haven**—Tuluol Plant—Ordnance Div., War Dept., Wash., D. C., let contract building plant to produce tuluol from gas, to H. Koppers Co., Union Arcade, Pittsburgh, Pa. About $110,000.

★**Mass., Springfield**—Storage Plant—Cantonment Div., War Dept., Wash., D. C., let contract, to Casper Ranger Constr. Co., 20 Bond St., Holyoke; cost plus percentage.

★**N. Y., Brooklyn**—Laundry Equipment—Bureau Yards & Docks, Navy Dept., Wash., D. C., let contract, to Troy Laundry Machine Co., 133 Centre St., New York City, $19,190 (65 days). Noted June 20.

★**N. Y., Brooklyn**—Paving—Brooklyn Navy Yard let contract paving road from 33rd St. to aero storage, to Fleming O'Brien & McEngar, Inc., 116 Broad St., New York City, $5069 (20 days). Noted May 23.

N. Y., New York—Boilers—Bureau Yards & Docks, Navy Dept., Wash., D. C., received bids installing boilers at Wards Island (work complete) from Heine Safety Boiler Co., New York City, $42,800 (110 days). Noted June 20.

N. Y., New York—Pier—Bureau Yards & Docks, Navy Dept., Wash., D. C., received bids, June 24, building timber "T" pier at Wards Island (work complete), from A. M. Hazell, Inc., 26 Cortlandt St., $8937 (30 days); McHard Barton Co., 171 Madison Ave., $10,884 (40 days); Snare & Triest, 8 West 40th St., $10,880 (40 days). Noted June 20.

N. Y., New York—Radial Block Chimney—Bureau Yards & Docks, Navy Dept., Wash., D. C., received bids June 24, building at Wards Island (work complete), from Rust Eng. Co., Farmers Bank Bldg., Pittsburgh, Pa., $11,690 (55 days) alternate $8600 (55 days); M. W. Kellogg Co., 90 West St., New York City, (1) $11,939 (65 days) alternate $2060 (1b) $6550 (50 days), (2a) $1641, (2b) $1050, (3) $6350 (50 days), (3a) $1641, (3b) $1050; Heine Chimney Co., 123 West Madison St., Chicago, $12,432 (55 days) alternate $11,135 (50 days). Noted June 20.

N. Y., Rockaway—Extension to Naval Air Station—Bureau Yards & Docks, Navy Dept., Wash., D. C., received bids June 24, (a) price and time for work complete; contractor shall state time of completion of each building, (b) amount and time added or deducted from (a) if shingles are used instead of siding, from J. K. Turton Corp., 101 Park Ave., New York City, (a) $184,700 (90 days) (b) deduct $500; Wise Constr. Co., 40 Court St., Boston, Mass., (a) $186,000 (80 days) (b) deduct $15,000; Lustig Weil, 103 Park Ave., New York City (a) $189,800 (150 days) (b) $3000. Noted June 13.

N. Y., Rockaway—Hangars, Railway and Pier—Bureau Yards & Docks, Navy Dept., Wash., D. C., received bid building timber seaplane hangars, C. D. and E. at Naval Air Sta.,

Federal Work Government (Continued)

(1) Price and time for 110 x 166 x 35 ft. hangar (hangar C) complete, including platform.

(2) Price and time for 104 x 210 x 24 ft. hangar (hangar D and E) complete, including platform.

(3) Price for 2 hangars complete, and time for each separately.

(4) time for marine railway and landing pier complete, and unit prices for same as follows: (a) price per pile, in place, 35 feet long, (b) price per M ft. BM. in place for timber, (c) price per lb. in place for nails, bolts, and spikes, (d) price per lb. in place for rails, splices and yokes, (e) price per lin.ft. for piles of greater or less length than 35 ft. from

Barney, Ahlers & Co., 110 West 40th St., New York City, (1) $55,850, 35 days, alternate $60,000, 25 days, (2) $54,990, 35 days, (3) $108,500, for (c), (d), and (e), 60 days, (4a) $31.50, (4b) $231, (4c) $0.15½, (4e) $0.60.

Post & McCord, 101 Park Ave., New York City, (1) $56,258, 56 days, ()2 $51,400, 56 days, (3) $107,000, 56 days, (4a) $32.50, (4b) $2.40, (4c) $0.16, (4d) $0.11, (4e) $0.80.

Snare & Triest Co., 8 West 40th St., New York, N. Y. (1) $62,300, 60 days, (2) $64,700, 60 days, (3) $124,000, (4a) $80, (4b) $400, (4c) $0.20, (4d) $0.15, (4e) $0.50. Noted June 13.

★**N. Y., Sayville**—Water Mains—Sayville Navy Yard let contract installing here, to Hill, 1455 McCormick Ave., Ozone Park, $6,415. Noted June 13.

N. J., Cape May—Emergency Hospital—Bureau Yards & Docks, Navy Dept., Wash., D. C., received bids building 6 units to Naval Hospital (a) price and time for work complete not including moving picture booth, (b) amount and time deducted from (a) if recreation building is omitted, (c) price and time added to (a) if moving picture booth is included, (d) amount and time deducted from (a) if railroad spur and alterations and repairs to roads in connection with same be omitted (e) amount and time added to (a) if all existing returns from present heating system be made complete vacuum return system, from

Dawson Constr. Co., May Bldg., Pittsburgh, Pa.

(a) $84,943 (90 days) (b) deduct $12,000 (c) $385 (d) deduct $6000.

H. F. Friedstedt, 327 South La Salle St., Chicago.

(a) $133,653 (90 days) (b) $16,700 (5 days) (c) $500 (d) $5000.

Williams Gerstle Eng. Co., 198 Bway., New York City.

(a) $88,743 (90 days) (b) $9318 (10 days) (c) $672 (1 day) (d) $6624 (8 days) (e) $3500 (15 days). Noted June 13.

★**N. J., Cape May**—Foundation for Gas Holder—Bureau Yards & Docks, Navy Dept., Wash., let contract, to Williams-Eng. Co., 198 Bway., New York City, $9,997 (50 days).

N. J., Lake Denmark—Fire Protection and Water System—Bureau Yards & Docks, Navy Dept., Wash., D. C., received bids June 24, building at Naval Ammunition Depot, (work complete), from Genl. Heating & Ventilating Co., 198 Milwaukee St., Milwaukee, $79,917 (120 days); W. G. Cornell Co., 923 12th St., N. W., Wash., D. C. (a) $113,884 (120 days); Blower Automatic Sprinkler Co., 2035 Washington Ave., Phila., $154,000 (190 days). Noted June 6.

★**Pa., Erie**—Housing Facilities—Cantonment Div., War Dept., Wash. D. C., let contract, to H. Shenk Co., 12th and Sassafras Sts.; cost plus percentage. See "Washington, D. C., June 6."

★**Pa., Ft. Mifflin**—Ammunition Filling Houses—Bureau Yards & Docks, Navy Dept., Wash., D. C., let contract building 2 ammunition filling houses, to Work-Yardley Co., 1737 Filbert St., Phila., $54,221 (60 days). Noted June 20.

Pa., Phila.—Drill Building—Bureau Yards & Docks, Navy Dept., Wash., D. C., received bids, June 24, building for armed guard at Navy Yard, here (work complete), from Seth Linthicum, 220 St. Paul St., Baltimore, Md., $39,450 (35 days); Work-Yardley Co., 1737 Filbert St., $47,550 (90 days); W. R. Dougherty, 1608 Sansom St., $47,994 (75 days). Noted June 13.

★**Wash., D. C.**—Administration Group—Bureau Yards & Docks, Navy Dept., Wash., D. C., let contract completing buildings Nos. 21, 22 and 23, Hampton Roads, Va., to R. R. Richardson Co., Norfolk, Va., $73,892. Noted June 20.

★**Wash., D. C.**—Buildings—Bureau Yards & Docks Navy Dept., Wash., D. C., let contract completing certain buildings at Anacostia, to L. E. Breuninger 706 Colorado Bldg., $6120 (25 days). Noted June 13.

Wash., D. C.—Grading—Dist. Comrs., Dist. Bldg., let contract grading Longfellow and Kennedy Sts., and Colcord Ave., to G. B. Mullen, 3329 14th St., $17,200. Noted May 30.

Wash., D. C.—Magazine Building—Bureau Yards & Docks, Navy Dept., Wash., D. C., received bids June 24, building at Naval Air Sta., Anacostia, (work complete), from L. E. Breuninger & Sons, Colorado Bldg., $4350 (25 days); W. E. Mooney, 505 Evans Bldg., $4398 (30 days); Hyde & Baxter, 119 Carroll Ave., Tacoma Park, $5385 (30) days. Noted June 20.

Wash., D. C.—Power Plant Improvements—Bureau Yards & Docks, Navy Dept., Wash., D. C., received bids building at Navy Yard, here, (work complete) from Gillis & Gehagen, 537 West Bway., New York City, $44,806 (120 days); Premier Eng. Co., 107 West 13th St., New York City, $45,779 (150 days); W. G. Cornell Co., 923 12th St., $48,884 (120 days). Noted June 13.

★**Wash., D. C.**—Sewers, Dist. Comrs. Dist. Bldg., let contract building Old Tiber sewer, 27th to 29th St., and 34th St. sewers, to W. F. Brenizer, 101 New York Ave. Noted June 20.

S. C., Paris Island—Barracks—Bureau Yards & Docks, Navy Dept., Wash., D. C., received bids June 24, building addition to marine barracks,

(1) Price and time for work complete for all new buildings, additions, alterations, moving and demolition of buildings including sewer, water, steam and electric systems complete, except hospital group HQ, HR and HS at main station, including the moving of certain buildings and service of utilities required for same.

(2) Price and time for work complete for new hospital group HQ, HR and HS, main station, including covered walks between administration building and wards and between administration and hospital corps barracks, moving and relocating sewer, steam and electric systems necessary to serve these buildings and connection of such services to existing or new systems installed under (1).

(3) Price and time for work complete for the concrete roads and walks at main station.

(4) Price and time for complete for sea wall "AF" at main station.

(5) Prices and time for work complete for each pier separately as follows:

(a) extension to existing pier, main station, designated "AB."

(b) new pier at maneuver grounds, designated "AC."

(c) new pier at quarantine station, designated "AD."

(d) new repairing wharf and boat shed at main station, designated "AE."

(6) Price per cu.yd. and time required, measured in place for dredging and disposing of all material; price shall be based on 35,000 cu.yds.

John Griffiths & Son Co., 112 West Adams St., Chicago, (1) $1,666,600, 120 days, (2) $89,797, 10 days, (3) $29,000, 5 days, (4) $26,200, 5 days, (5a and B) $16,500, 2 days, (5c and A) $6000, 2 days, (a and d) $4000, 2 days, (a and e) $9000, 2 days, (6) $1.00.

Paschen Bros., 111 West Washington St., Chicago, (1) $1,773,000, 120 days, (2) $121,000, (3) $69,495, (4) $64,000, (5a) $24,900, (5b) $7200, (5c) $9900, (5d) $18,700, (6) $39,00. Noted June 20.

★**Kan., Ft. Riley**—Road—A. Herman, Constr. Quartermaster, Ft. Riley, let contract building government road through Ft. Riley, to Richie Bros., Topeka, $1.40 per yd.

Cal., Mare Island—(Vallejo P. O.)—Chronometer and Time Station—Mare Island Navy Yard received bids June 24, from Lange & Bergstrom, 206-210 Sharon Bldg., San Francisco, $7942 (60 days); F. Gallagher, 180 Jessie St., San Francisco, $8125 (80 days); W. C. Duncan & Co., 508 Sharon Bldg., San Francisco, $8288 (78 days). Noted June 20.

★**Cal., San Diego**—Foundation and Erection of Dirigible Hangar—Bureau Yards & Docks, Navy Dept., Wash., D. C., let contract, to Lange & Bergstrom, Sharon Bldg., San Francisco, $13,893 (55 days). Noted June 20.

MISCELLANEOUS

Proposed Work

Dry Dock—Jersey City, N. J.—Federal Shipbuilding Co., Lincoln Highway, having plans prepared for dry dock, 1000 ft. long, on Hackensack Meadows between Yale and Communipaw Aves.

Dry Dock—Jersey City, N. J.—Morgan Eng. Co., foot Morgan St., applied to City Comn., for permission to build at its plant.

Dock—Miami, Fla.—See "Buildings."

Cement—Springfield, Ill.—Dept. Pub. Wks. soon lets contract furnishing all portland cement required by Dept. Pub. Wks. and Buildings and all portland cement required for use on work executed by or under direction of same. H. E. Bilger, road engr.

Dam—Coleman, Tex.—See "Waterworks."

Dam—Port Arthur, Tex.—Jefferson Co. (Beaumont) plans to build 18 mi. dam over Neches River between here and Oil Trough.

Dam St. Johns, Ariz.—State Legislature, Phoenix, appropriated $120,000 to build Lyman dam in Apache Co.

Dock Facilities—Portland, Ore.—See "Industrial Works."

Pier—San Francisco, Cal.—State Bd. Harbor Comrs. plan to build rein.-con. pier to replace present pier No. 1.

Foundation—Sydney, N. S.—Dominion Steel Corp. soon lets contract building foundation of large steel plate mill. Work involves 150,000 cu. yd. excav. Noted Feb. 7 under "Industrial Works."

Retaining Wall—Edmonton, Alta.—City soon receives bids building retaining wall, 600 ft. long, in connection with swimming pool at Borden Park. A. W. Haddow, city engr.

BIDS DESIRED

Dock—Yoman, Wash.—Until July 5, by Comrs. Pierce Co., Tacoma, building rein.-con. dock here.

Dam and Flume—Elora, Ont.—Until July 1, by City, building dam and flume over Grand River. Bowman & Connor, 31 Queen St., W., Toronto, engrs.

PRICES AND CONTRACTS AWARDED

(★Indicates award of contract.)

★**Pier—East Boston, Mass.**—Waterways Comn., State House, Boston, let contract building short pier, to W. L. Miller Co., Charlestown, $294,440. Noted June 20.

Rollers—New York, N. Y.—F. K. Dowling, Pres. Manhattan Boro., received low bids furnishing and delivering two 12-ton tandem asphalt steam rollers, from Buffalo Springfield Roller Co., Kenton St., Springfield, O., $6390. Noted June 13.

★**Stages and Stands—New York, N. Y.**—Bronx Exposition Co., Times Bldg., will build two 1 story frame stages and stands, 177th St. from Bronx River to New York, Westchester & Boston R. R. Work will be done by day labor. About $27,000.

★**Flood Control—Erie, Pa.**—City let contract building Sect. 1, outlet section, of Mill Creek Flood Control Project, to Folwell-Ahslkog Co., Chicago, $30,544. Noted June 13 under "Sewers."

Shore Protection—Wis., Kenosha—City received low bid from McMullin & Pitz, Kenosha. About $65,000.

★**Rolling Doors—Portland, Ore.**—Dock Com. let contract furnishing steel rolling doors for grain elevator, to J. McCracken Co., Blake McFall Bldg. About $18,000.

Street-and-Road Contracts Being Let

In the month of May we announced the awarding of contracts involving 217 distinct road-paving operations throughout the United States. These were of all classes and cost $12,726,829. The square yards totalled some 5,758,000.